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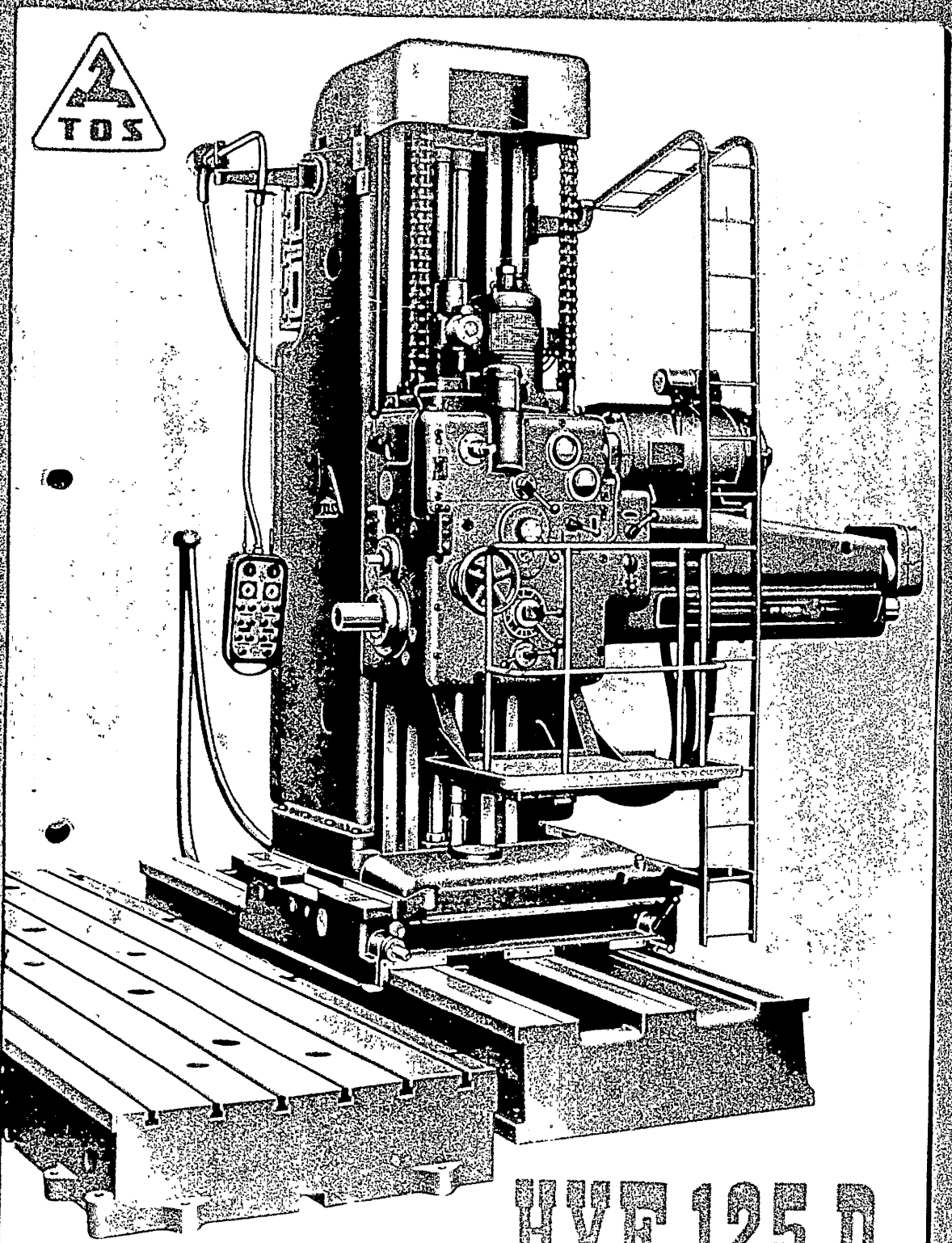

HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

HYF 125 D

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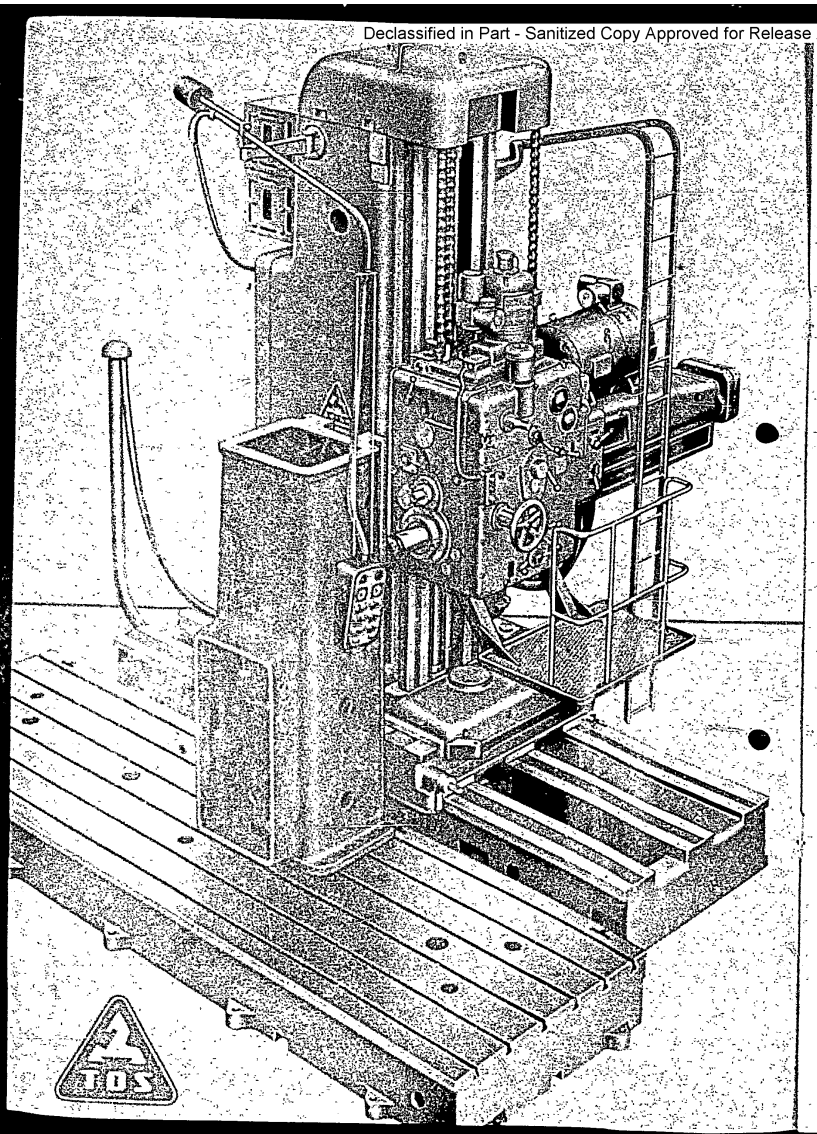

HYF 125 D

HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

This horizontal floor plate type boring machine has a column with a cross movement and a large clamping plate which is separate from the machine proper. It is suitable for milling and boring operations on heavy and intricate objects which could not be clamped to the table of table type boring machines.

DESCRIPTION

High power main motor with infinite speed variation within a range of 1 : 4.32.

Infinite variation of speeds within a wide range. The speed of the main and high speed spindles can be infinitely varied in 4 ranges with an overall range of 1 : 60. Since the ratio of the high speed spindle and main spindle speeds is 4 : 1, the total speed range of the whole machine is 1 : 240.

The infinite speed variation of the main spindle in a range of 5.25 to 315 r. p. m. and of the high speed spindle in a range of 21 to 1250 r. p. m. allows cemented carbide tipped tools to be fully utilized.

The infinite variation of milling feeds, i. e. feeds of the headstock and of the column, 3 ranges with an overall range of 1 : 40 enables the most suitable feed to be selected for any of a variety of [illegible] operations.

The milling feeds are driven by a motor with an infinite speed variation within a range of [illegible].

The high speed spindle is arranged above the main spindle. A suitable speed and feed [illegible] by means of a lever mechanism on the headstock in accordance with indicating plates. The [illegible] feed variation is operated [illegible] the machine is running, by depressing a control knob [illegible] control panel.

A suitable setting of the safety clutch in the feed drive prevents undesirable overload of the [illegible] damage to the tools.

Adjustable stops in the drive limit the feed of the spindles in both directions and disengage it automatically.

For the mounting of both spindles anti-friction bearings with an increased accuracy have been used which allow the play to be eliminated. This mounting satisfies reliably the requirements placed upon the working precision of the machine.

Electric indicators of the spindle speeds and rates of milling feeds are mounted on the control panel and afford a quick check of the engaged speeds or feeds.

An accurate setting of the column and headstock is facilitated by inching push buttons on the panel. It is checked by a measuring equipment with gauges and verniers.

The removable face plate with the cross slide, which is supplied as an item of optional equipment, facilitates machining of large diameters and milled surfaces. It is mounted on a hollow spindle.

Screwcutting equipment (supplied as optional equipment) enables metric and Whitworth threads of all common sizes to be cut by means of change gears.

A sight glass on the headstock allows the central lubrication of all the mechanisms to be checked. The operation of the lubricating system is signalled by a signal light on the headstock.

The high grade material of the gears, which are hardened and, wherever necessary, ground, the fitting of sliding gears on spline shafts with anti-friction bearings and careful workmanship ensure a long life lasting accuracy and a high efficiency of the whole machine.

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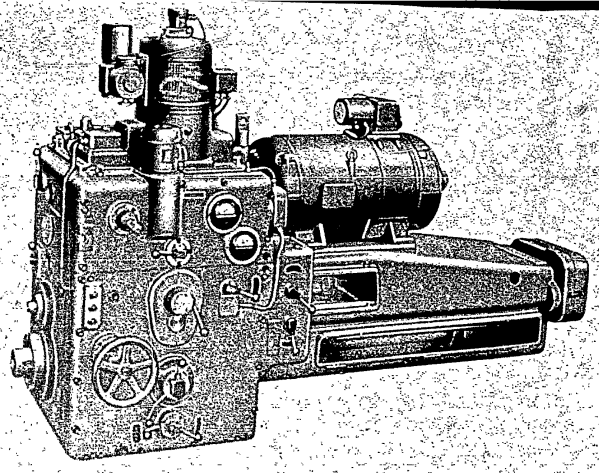

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ment as well as the rapid traverse of the spindle, headstock and column. The headstock is driven by a reversible commutator motor with infinite speed variation within a range of 1 to 4,32. A special brake acting automatically when the "stop" push-button is depressed reduces the coasting times of the machine to a minimum. The infinitely variable speeds are arranged in 4 ranges. The required range is set in advance by means of a speed selector and engaged by the lever of the selector. The required speed within the range which has been pre-selected is set by a push-button.

The feeds are divided into boring feeds (in mm per revolution) acting upon the main and high speed spindle and milling feeds, moving the headstock vertically along the column or the column across the bed. The boring feeds are variable within a wide range by means of sliding gears on spline shafts. A suitable range of milling speeds is set by means of a lever mechanism in accordance with indicating plates on the headstock and the rate of feed by means of a push-button on the control panel.

The radial play of the spindles can be eliminated by tightening a tapered bronze bush. With the face plate removed face milling cutters and other tools can be fitted to the face of the hollow spindle.

The change-over from feed to rapid traverse is made possible by a built-in electric motor operated multi-plate clutch. The starting and reversing of the electric motor is done by depressing the appropriate push-button on the control panel.

The coarse as well as the fine movement of the main and high speed spindles are controlled by a hand wheel on the headstock. At the right hand side of the headstock there is an arm with a gelde for the driver bearing of the main spindle.

All driving mechanisms in the headstock are lubricated by a gear pump with its own electric motor, the guideways and sliding surfaces of the column and slide by a hand pressure pump.

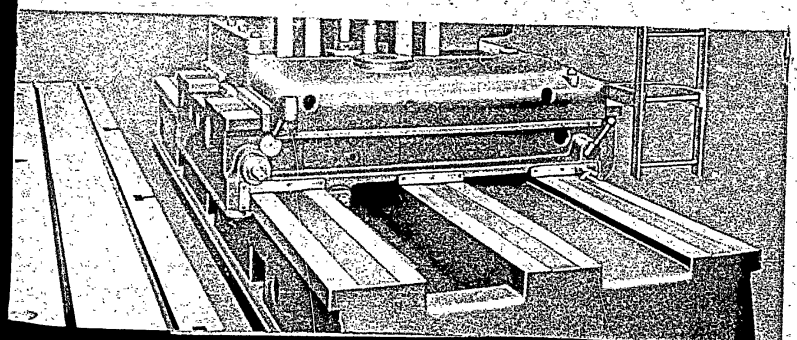
The column is box shaped and well stiffened with internal ribs. The main movement of the column is transverse, perpendicular to the axis of the spindle. The movement of the column along the axis of the spindle on a length of approximately 300 mm (12") is used to advantage for the final adjustment of the milling cutter or face plate slide in relation to the work-piece.

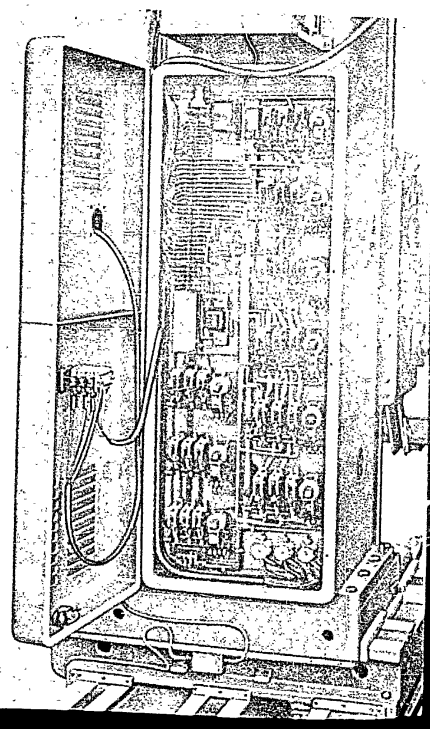
The bed, which is heavily stiffened with ribs and has wide guideways, ensures a smooth movement of the column even under the heaviest load. It is provided with holes for the foundation bolts and lifting screws for setting up and levelling on the foundation.

Simple and convenient operation of the machine is made possible by the centralization of all the controls on the control panel. The control panel is suspended on a structure which allows it to be moved to any point most convenient for the operator. The push-buttons on the control panel allow:

The engage ent and disengagement of all the boring and milling feeds, permanent engagement of feeds and inching, infinite variation of feeds and speeds within the selected ranges, checking of the set feeds and speeds and immediate stopping of the machine by means of a push-button (general stop). By this arrangement the reduction of non-productive times to a minimum has been achieved.

The headstock, a box shaped and contains the main spindle and the high speed spindle, their drive, the boring feed drives (of the main spindle and that the high speed spindle), the milling feed drives (of the headstock and column), the screwcutting equip-





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DESCRIPTION OF OPTIONAL EQUIPMENT (supplied to special order against extra charge)

The floor plates are used in various alternatives together with the type W 14C5R circular table, the boring bar support or both simultaneously. The type W 14C5A circular table is an independent, portable equipment used for clamping heavier work-pieces for machining. It consists of a bed, a slide, a table and a feed box with an electric motor for the feeds and rotation of the table.

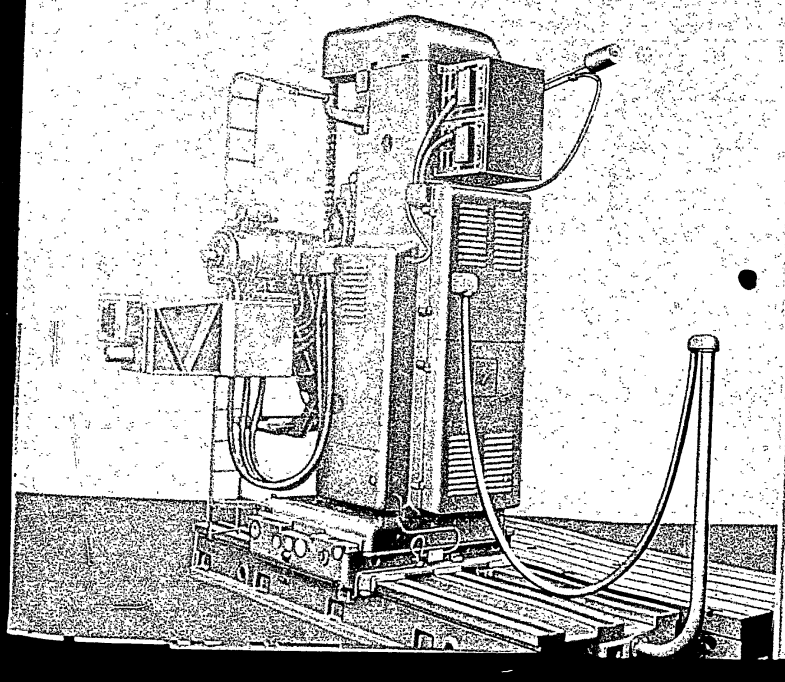
The removable face plate has a drive derived from the headstock. The engagement, disengagement and selection of feeds and speeds is done from the headstock; its speed is infinitely variable from the control panel.

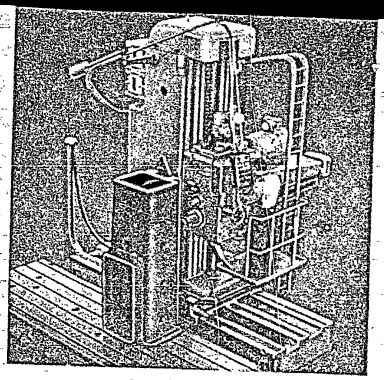
The cooling equipment consists of an electric motor driven pump, piping and a tank set up, as a rule, separate from the machine.

The telescopic holder is attached to the face plate slide and serves for boring abnormally large holes.

The boring bar is used in combination with the boring bar support and the guide bush and serves primarily for clamping and driving boring heads.

Screwcutting equipment. The feed of the main spindle is driven, for screwcutting, off a lead screw which has a positive drive through a gear box with change gears on a quadrant. With one set of 17 change gears 22 metric threads can be cut with leads of 0.5 to 12 mm or 32 Whitworth threads with 28 to 1 threads per inch.





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STANDARD EQUIPMENT

Complete electrical equipment — Spanners — Instruction plates and tables on machine — Operating instruction

OPTIONAL EQUIPMENT

Floor plates the total size of which depends on the number of plates used. These are of a size of 1650 x 3000 mm (118" x 197") and can be combined

Removable face plate, 710 mm (28") dia., maximum diameter of turning by means of tool slide 1550 mm (61")

Boring bar support including bed

Cooling equipment with electric motor driven pump

Telescopic holder

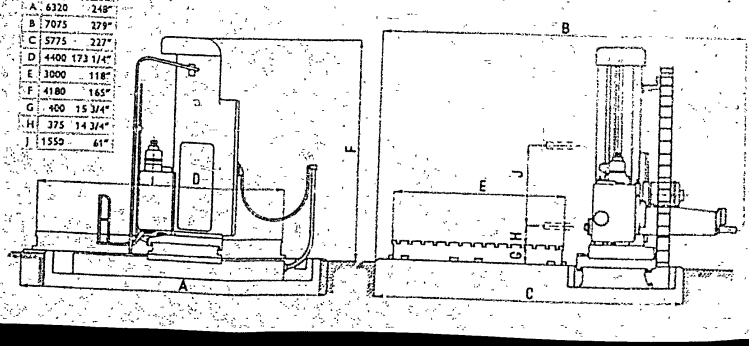
Boring bars with guide bushes of support

Overhung slide, single arm

Overhung slide, two-arm

Type W 14C5R circular table

A	6320	248"
B	7075	279"
C	5775	227"
D	4400	173 1/4"
E	3000	118"
F	4180	165"
G	400	15 3/4"
H	375	14 3/4"
J	1550	61"



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SPECIFICATION

OPERATING RANGE

Diameter of main spindle	mm	125	4 29/32"
Diameter of high speed spindle	mm	50	1 31/32"
Taper in main spindle		Metric 80	
Taper in high speed spindle		No. 4 Morse	
Distance, main spindle to high speed spindle	mm	250	9 27/32"
Maximum diameter for turning faces	mm	1050	41 3/8"
Maximum boring diameter of main spindle	mm	850	33 1/2"
Maximum single passage boring depth of main spindle	mm	1000	39 3/8"
Overall boring depth with main spindle moved forward	mm	1525	60"
Boring depth of high speed spindle	mm	300	11 13/16"
Lowest position of centre-line of main spindle above bed	mm	785	31"
Vertical movement of headstock on column	mm	1550	61"
Transverse movement of column on bed	mm	2500	98 3/8"
Longitudinal movement of column (in direction of centre-line of spindle)	mm	300	11 13/16"
Dimensions of floor plate*)	mm	3000 × 5000	118" × 197"

SPEEDS

Speed of main spindle infinitely variable in 4 ranges	r. p. m.	5.25 to 315
Speed of high speed spindle infinitely variable in 4 ranges	r. p. m.	21 to 1250
Range of infinite speed variation		1 : 4.32

FEEDS

16 boring feeds of main spindle, per rev.	mm	0.056 to 4.5	0.0022" to 0.18"
16 boring feeds of high speed spindle, per rev.	mm	0.014 to 1.12	0.00056" to 0.045"
Milling feeds of headstock and column infinitely variable in 4 ranges, per min.	mm	14 to 550	35/64" to 22"
Range of infinite variation		1 : 2.52	
Rapid traverse of headstock, per min.	mm	1270	50"
Rapid traverse of column, lengthwise/crosswise, per min.	mm	1300/710	51"/28"
Rapid traverse of main spindle, per min.	mm	1720	68"

SCREWCUTTING*)

22 metric threads	lead mm	0.5 to 12
32 Whitworth threads	threads per inch	28 to 1

DRIVE

Main motor: Output, continuous**)	kW	12
Speed at continuous output	r. p. m.	900 to 2160
Overall speed range	r. p. m.	500 to 2160
Motor for movement of headstock and column:		
Output at 2160 r. p. m.	kW	4
Speed	r. p. m.	860 to 2160

WEIGHT OF MACHINE

With standard equipment	kg	25330	55840 lbs

*) Belongs to optional equipment of machine.
**) Output drops to 5.5 kW at 500 r. p. m.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS.

The particulars in the prospectus are not binding in detail.

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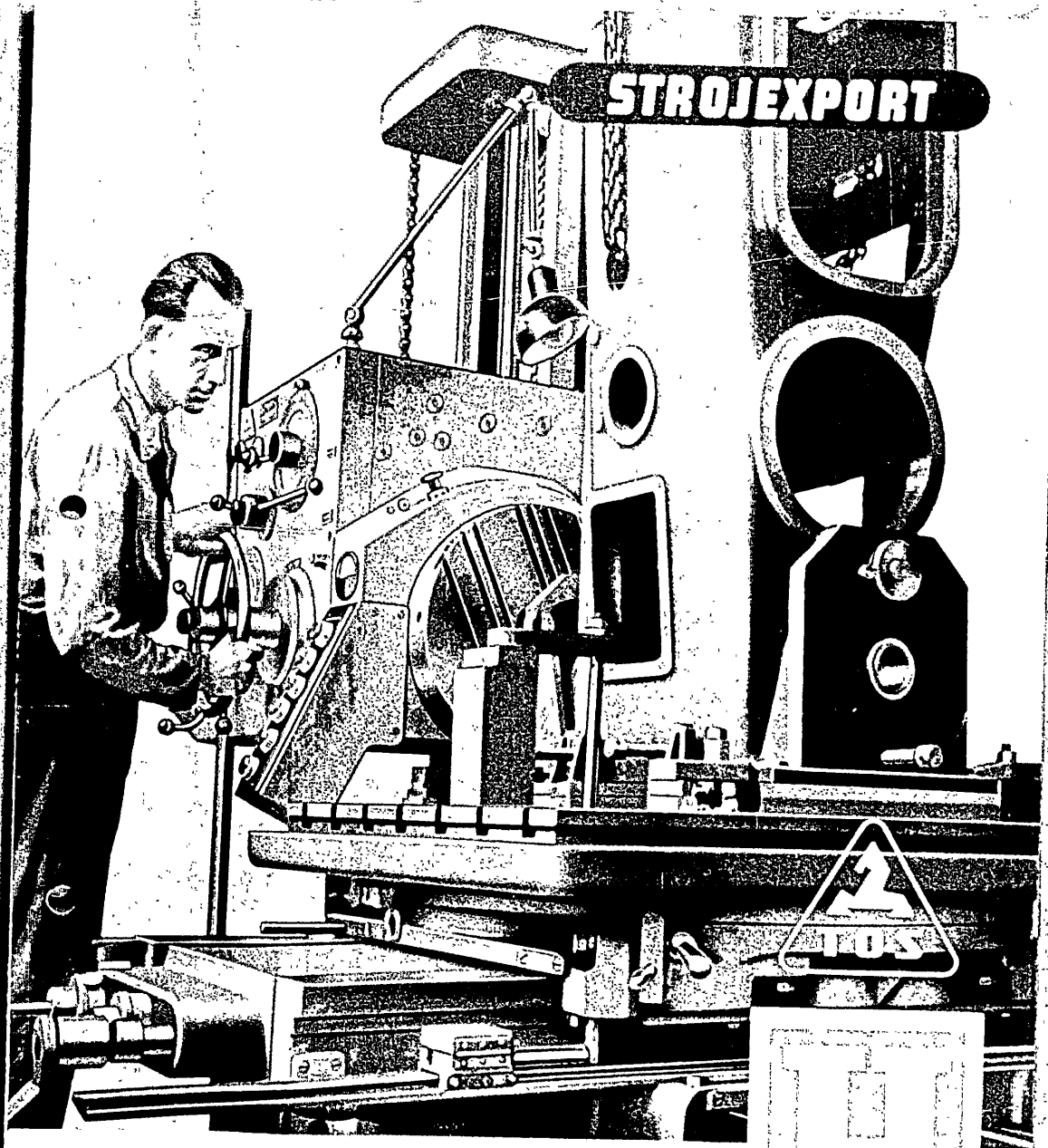

HORIZONTAL BORING MACHINE

TYPE

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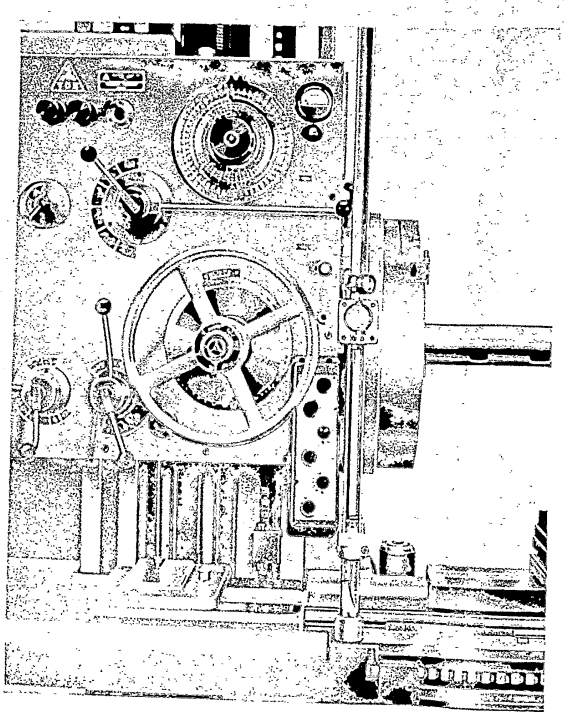


TYPE H 100 HORIZONTAL BORING MACHINE

This machine is designed and built for precision boring, drilling, milling, threading, reaming and facing and meets every requirement of machine tool users, where precision work to close limits and smooth finish of the machined surface are of prime importance. Rigidity of construction and special care taken in selection of material as well as perfect workmanship ensure reliability in service and permanent accuracy of the machine.

Outstanding Features.

Enduring accuracy,
High production,
Wide speed and feed range,
Use of carbide tipped tools,
Smooth and quiet running at all speeds,
Ease of operation.

Table. The table is arranged for hand and power feed in the longitudinal and cross direction as well as for circular feed. The cross ways of the longitudinal slide are reinforced by special supports to eliminate any possibility of distortion of the table in its extreme cross positions even at maximum load.
The table is provided with accurately planed T-slots for clamping the work and in its centre with a centering hole for accurate location of the work or fixture.

Bed. The bed has wide, flat accurately ground guides. It is adequately ribbed and enclosed at the top.

Column. The vertical guideways for the headstock are accurately ground, the right-hand guide being especially wide. Thus precision guiding of the headstock is ensured even after a long time of service.

Boring Bar Support. The boring bar support for supporting long boring bars is longitudinally adjustable by hand. The bar support bearing can be vertically moved by a handcrank and finely adjusted by a hand wheel.

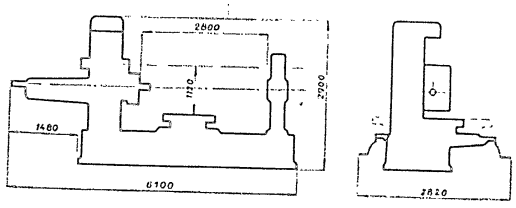
Lubrication. All bearings and gears in the headstock are lubricated by a geared pump. For inspecting the oil level an oil gauge and for the function of the pump an oil flow indicator is provided on the front of the headstock. The bearing and contact surfaces of the slide and table are lubricated by grease gun. The other oiling points are fitted with oilers located in plain view of the operator.

Electrical Equipment. The machine is driven by an asynchronous flanged type electric motor. Starting, stopping and reversing is by contactors controlled by push buttons on the front of the headstock. Push buttons serve for fine adjustment of the spindle or face plate when setting-up the machine.
The loading of motor is visible on the ammeter.
The motor is protected against overload by fuses and thermal protective relays.
The machine can only be driven by a 3-phase A. C. for 380 volts, 50 cycles [illegible] machines for an other voltage and frequency can be supplied only exceptionally.

Cooling Attachment. The cooling attachment is supplied as optional equipment [illegible] the machining of steel and cast steel, and consists of an electric pump [illegible] provided inside the bed and is fitted with a filter.

STANDARD EQUIPMENT: Attachment for vertical adjustment of headstock [illegible] and indicator), attachment for cross adjustment of table (without end measures [illegible] ment for vertical adjustment of bar support bearing, magnifying glass, set of spanners, grease gun [illegible] ting plate, operator's instruction booklet.

OPTIONAL EQUIPMENT: On request and at an extra charge the machines are supplied with the following attachments:
Cooling attachment with electric pump, leading elongation, clamping elongation [illegible] boring attachment, telescopic tool-block, single or double-arm star feed facing head, boring bar [illegible]



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HEADSTOCK The headstock embodies the driving, feeding and rapid traverse mechanisms. It is fully oil-tight and dirt-proof. The spindle speeds in 3 ranges in geometrical progression produce 27 speeds.

The lower and middle range are used for work with the face plate, the middle and high range for operations with the spindle. The speed mechanism allows for independent drive of the face plate, mounted on a special separately arranged hollow spindle. The low speeds are transmitted through a rim gear mounted directly in the face plate. This arrangement proves especially suitable for work with the facing head as well as when applying multiple tool heads. Another advantage is the possibility of machining by using the workspindle and the face plate simultaneously, either as equal or different speeds. The direction of the spindle and face plate rotation is changed by reversing the motor.

The spindle speed change is effected by electromechanical pre-selection. The speed necessary for the subsequent operation is set by adjusting the speed selection dial during the previous operation, and engaged at the required moment by depressing a push button. Thus the time necessary for speed change is reduced to a minimum. The speed changing mechanism is driven by an independent electric motor enabling the speeds to be changed also while the spindle is at rest.

SPINDLE MOTION The spindle is made of high-quality steel and on its bearing surfaces it is accurately ground. The facing head spindle and the hollow spindle are mounted in accurately adjustable bearings. The heating of the bearings is negligible even at the highest speeds.

Feeds: For drilling and boring 32 rates are available transmitted from the work spindle and ranging from 0,2 to 12 mm/rev for the spindle feed, vertical travel of headstock and for longitudinal and cross travel of table. The same number and rates of feed are provided for the face plate. For milling, 18 rates for spindle feed, vertical travel of head and longitudinal as well as cross travel of table are available, independent of the spindle rotation and ranging from 12,5 to 600 mm per minute. The feed change is by electromechanical pre-selection.

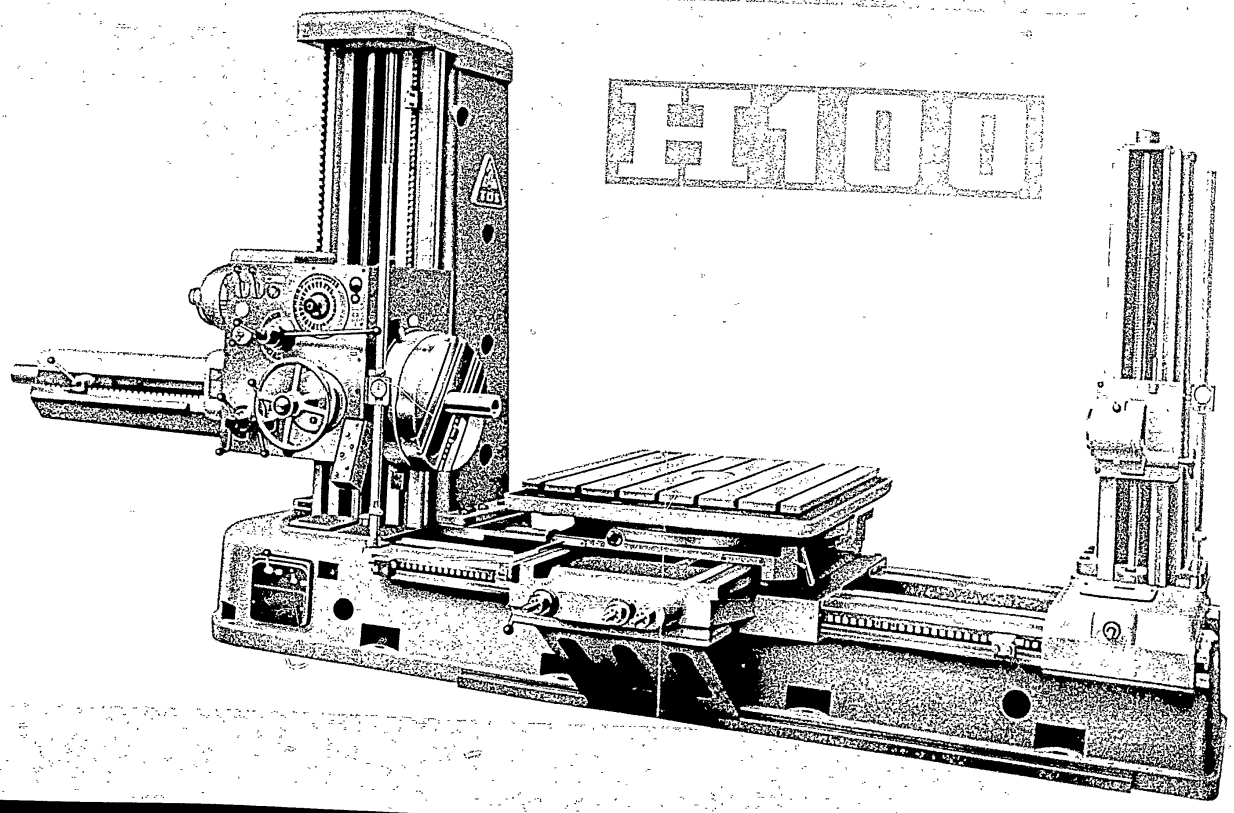
The machine is equipped with rapid motions in all directions. The rapid motions are independent of the work spindle rotation and act always in a direction opposite to the work feed, thus eliminating any damage to the work or tool. The rapid motion may be engaged automatically immediately after releasing the work feed.

Automatic release of work feeds and rapid motions of headstock and longitudinal as well as cross feed of table is accomplished by adjustable stops.

THREAD CUTTING ATTACHMENT The machine is arranged for cutting metric threads with a pitch of 0,25 to 12 mm and Whitworth threads of a pitch of 2½ to 120 threads per inch.

The machine is fitted with a starting friction clutch against overload which is interposed between the motor and the gear mechanism. If the table strikes an obstacle, a safety clutch is put into operation and automatically disengages the working feed or the rapid traverse.

H 100



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SPECIFICATION

Diameter of spindle	mm	100	3 ⁹⁄₁₆"
Taper in spindle	Morse No	6	6
Max. diameter for boring	mm	600	23 ⅝"
Max. diameter for facing	mm	900	35 ⅜"
Continuous Additional feed to spindle	mm	900 450	35 ⅜" – 17 ¾"
Max. Min. distance centreline of spindle top of table	mm	0 – 1120	0 – 44 ⅛"
Max. distance facing head to bar support	mm	2800	110"
Diameter of facing head	mm	600	23 ⅝"
Centering dia. of facing head	mm	280 H 6	280 H 6 mm
Width of facing head	mm	8	5/16"
Working surface of table (width x length)	mm	1120 x 1250	44 ⅛" x 49 ⅛"
Centering dia. of table	mm	180 H7	180 H7
Width of table centering surface	mm	6	¼"
Automatic cross travel of table	mm	1250	49 ⅛"
Automatic longitudinal travel of table when in cross position	mm	1400	55"
Automatic longitudinal travel of table when in longitudinal position	mm	1250	49 ⅛"
Number of spindle speeds		25	25
SPEED RANGE:			
Low speed band I speeds to spindle and facing head	r. p. m.	2,8 – 18	2,8 – 18
Middle speed band II speeds to spindle and facing head	r. p. m.	18 – 112	18 – 112
High speed band III speeds to spindle and facing head	r. p. m.	112 – 710	112 – 710
FEEDS:			
32 feeds to spindle	mm/rev	0,02 – 12	0,0008" – 0,5"
32 feeds to headstock	mm/rev	0,02 – 12	0,0008" – 0,5"
32 longitudinal feeds to table	mm/rev	0,02 – 12	0,0008" – 0,5"
32 cross feeds to table	mm/rev	0,02 – 12	0,0008" – 0,5"
32 feeds to facing head	mm/rev	0,02 – 12	0,0008" – 0,5"
32 circular feeds to table per spindle revolution (referred to dia. 1000 mm)	mm/rev	0,013 – 20	0,0005" – 0,78"
18 feeds to immobilized spindle	mm/min	12,5 – 600	½" – 24"
18 feeds to headstock	mm/min	12,5 – 600	½" – 24"
18 longitudinal feeds to table	mm/min	12,5 – 600	½" – 24"
18 cross feeds to table	mm/min	12,5 – 600	½" – 24"
18 feeds to facing slide	mm/min	12,5 – 600	½" – 24"
18 automatic circular feeds to table on 1000 mm (39 ⅜") dia.	mm/min	21,5 – 1000	1 ⁵⁄₃₂" – 39 ⅜"
Rapid traverse to spindle, headstock, table and facing slide/except circular movement of table	mm/min	2000	79"
Rapid circular movement of table	r. p. m.	1	1
THREADS:			
18 metric threads, pitch	mm	0,25 – 12	
18 Whitworth threads, pitch	t. p. i.		2½ – 120
Motor: Speed	r. p. m.	1500	1500
Output	HP	10,2	10,2
Floor space required	(width x length) mm	2820 – 6100	112" x 240"
Net weight of machine with standard equipment	kg	11 200	lbs 25 000
Weight of machine with packing	kg	12 600	lbs 28 000
Weight of machine with seaworthy packing	kg	12 600	lbs 28 000
Contents boxed	m³	19,3	cu. ft. 680

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

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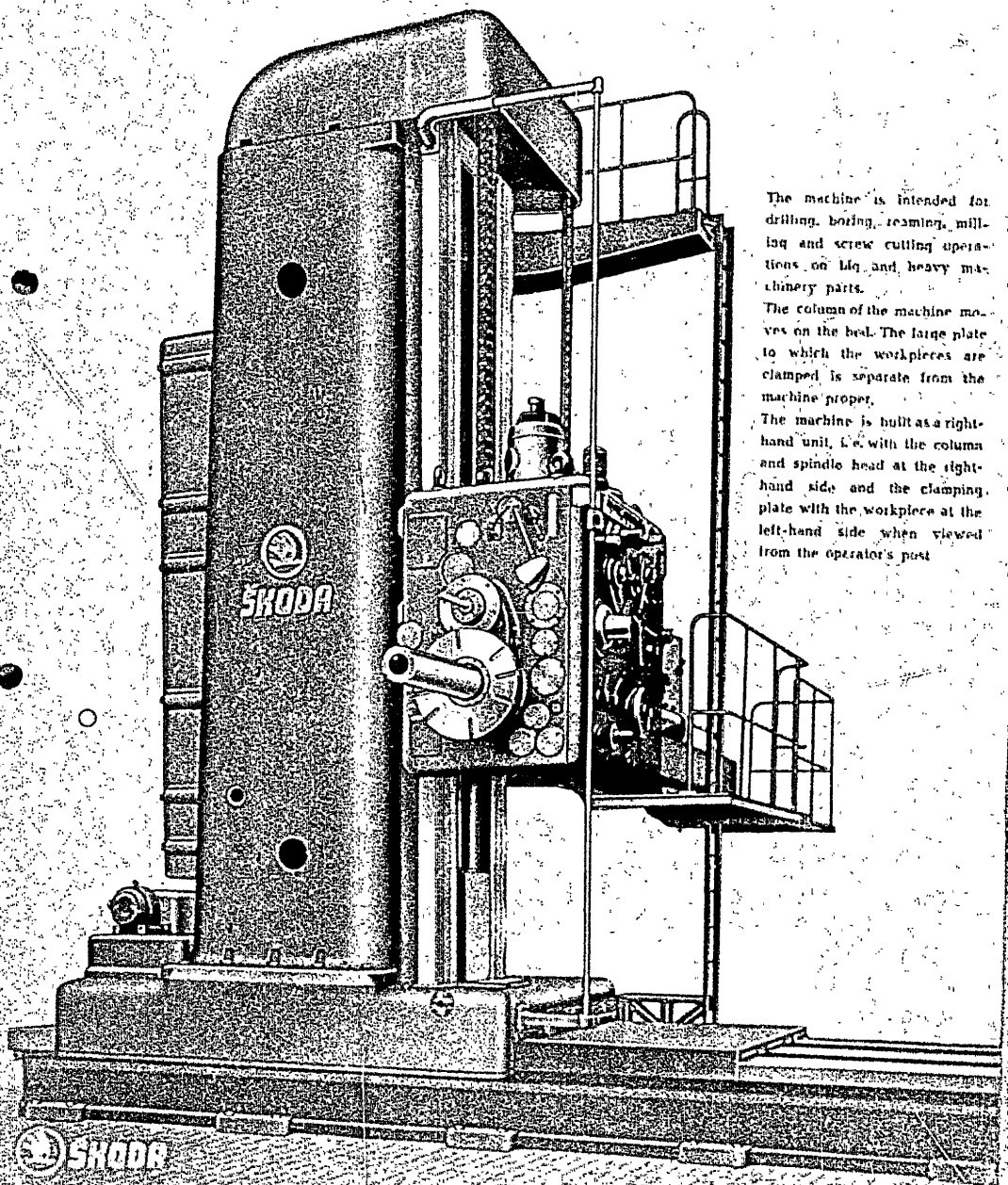
Type

Horizontal Bed Plate Type Boring Drilling and Milling Machine



The machine is intended for drilling, boring, reaming, milling and screw cutting operations on big and heavy machinery parts.

The column of the machine moves on the bed. The large plate to which the workpieces are clamped is separate from the machine proper.

The machine is built as a right-hand unit, i.e. with the column and spindle head at the right-hand side and the clamping plate with the workpiece at the left-hand side when viewed from the operator's post

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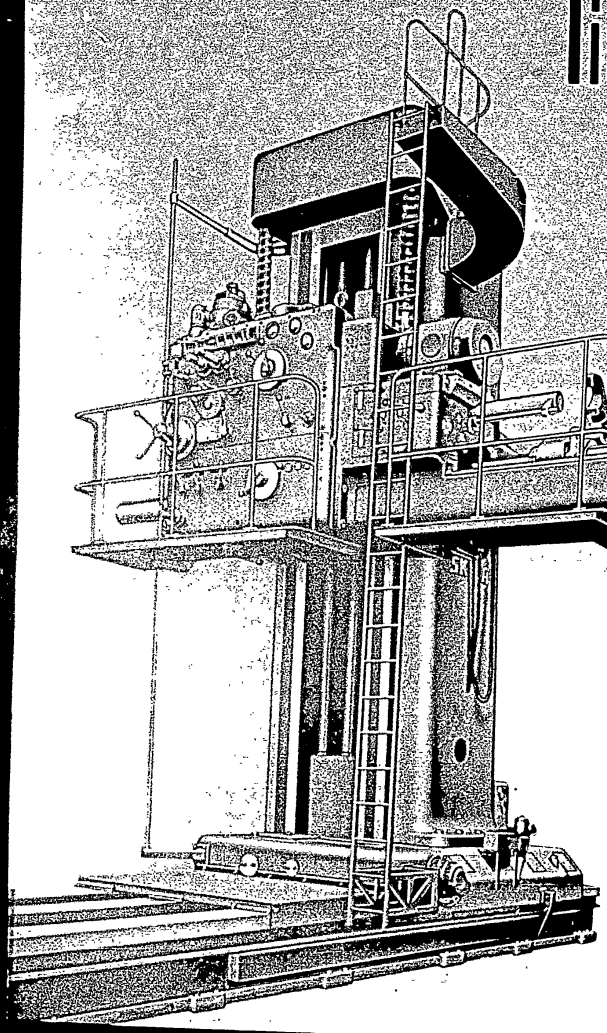
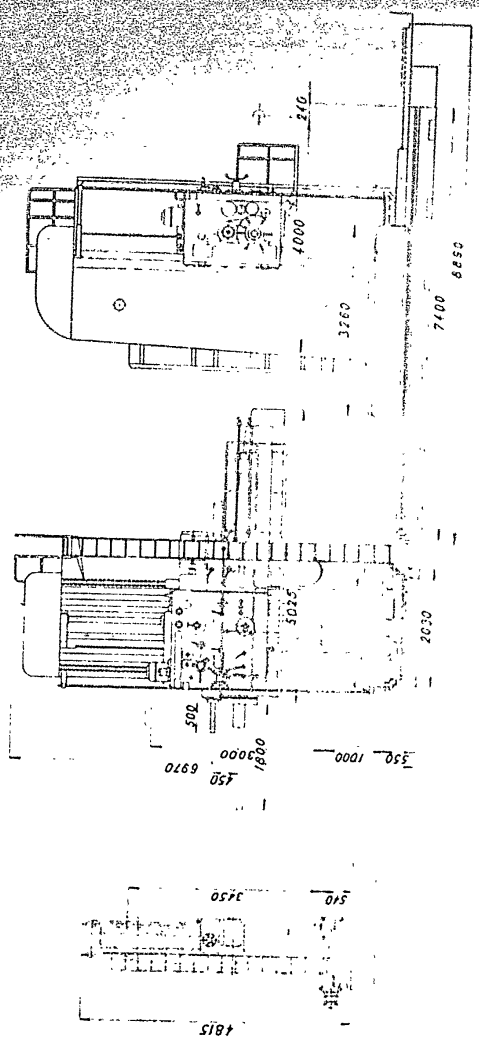


MAIN DIMENSIONS



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Outstanding Features

High power main motor and wide range of spindle speeds permit carbide tipped tools to be fully utilized for boring as well as for milling.

Wide range of milling as well as boring feeds permits suitable feed to be selected for variety of operations.

Electric indicator of spindle speeds allows continuous check of speed engaged. Load of main motor can be watched on ammeter. Both instruments are fitted to spindle head cover.

Spindle head and column are easy to set by means of push buttons from operator's post according to scales with verniers.

Safety clutches disengaging feed motor prevent overload of feed drive and thereby also damage to tool

Metric and Whitworth threads of current sizes can be cut on the machine.

Central lubrication of spindle head, in which most drives are centralized, with light signal indicating failures of lubricating system and pressure lubrication of guideways simplify operations and improve safety of operation.

High grade material of all gears and hardened and, wherever necessary, ground teeth, precision manufacture of splines of sliding gears and spline shafts running in anti-friction bearings and high grade workmanship of all other parts ensure lasting accuracy and high efficiency of machine.

Easy and convenient control of machine by portable push button panel controlling all motors reduces idle times to minimum

Description

THE SPINDLE HEAD is box shaped and contains the main spindle and the high speed spindle All the drives, drilling and milling feed assemblies, screw cutting equipment as well as the rapid traverse of the spindles, spindle head and column are centralized in it.

The main drive of the spindle head is powered by a reversible squirrel cage induction motor A special brake reduces the stopping time of the machine to a minimum when the push button is depressed

There are two kinds of feeds boring feeds (in mm per revolution) acting upon the main as well as the high speed spindle, and milling feeds (in mm per min.) moving the spindle head vertically on the column and the column across the bed. Both kinds of feed are variable within a wide range and arranged in fine steps.

The main spindle is carried in a sleeve with an adjustable tapered bush by which the spindle can be firmly gripped. The front end of this sleeve forms a flange to which milling cutters can be fitted and is carried in a tapered bush with an expanding wedge for accurate adjustment of the bearing play The thrust is borne by the rear bush provided with threads by which the spindle sleeve with the flange can be moved outward longitudinally by means of a worm gear

The multi-plate clutches are operated by a push button controlled electric motor

To the right-hand side of the spindle head an arm is fitted with a quick [illegible] driver bearing of the main spindle

All parts inside the spindle head are splash lubricated The oil is circulated by a gear type oil pump driven by its own electric motor

THE HIGH SPEED SPINDLE has a particularly high speed [illegible] box which permits sintered carbide tipped tools to be fed [illegible] diameters. It runs in an accurate finely adjustable [illegible]

THE SCREWCUTTING EQUIPMENT For screw [illegible] movement operated by a lead screw driven [illegible] change gears arranged in a gear quadrant [illegible] ting of 22 sizes of metric threads with [illegible] threads with 28 to 1 thread per [illegible]

THE COLUMN is well reinforced with [illegible] base which moves along the bed [illegible]

THE BED is of ample width and [illegible] allow perfect guiding and a firm base [illegible]

COOLING The machine is provided with [illegible] arranged, as a rule separate from the [illegible] piping

THE CONTROLS of the machine are situated [illegible] of all the motors is centralized on the [illegible] other hand on a portable push button panel [illegible] to control most of the movements of the machine [illegible]

To facilitate changes of tools adjusting [illegible] provided on the spindle head by means of which [illegible] kept running as long as the push button [illegible]

THE BACK REST which is only supplied [illegible] a short bed and a column with [illegible] moves crosswise on its bed perpendicularly to the [illegible]

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Specification

Diameter of main spindle	mm	200	7" 6"
Diameter of high speed spindle	mm	80	3" 6"
Taper in main spindle		Metric 120	
Taper in high speed spindle		No. 5 Morse	
Maximum torque on main spindle	kgcm	150000	10830 ft lbs
on high speed spindle	kgcm	15000	1083 ft lbs
WORKING RANGES			
Maximum diameter of boring with main spindle	mm	1700	5'7"
Maximum depth of boring with main spindle	mm	1800	5'11"
Maximum depth of boring with high speed spindle	mm	500	1'7"
Longitudinal sliding movement of main spindle	mm	100	3" 6"
Vertical movement of spindle head on column	mm	3000	9'10"
Cross movement of column on bed	mm	4000	13'1"
SPEEDS			
Number of main spindle speeds		24	
Number of high speed spindle speeds		24	
Main spindle speeds	r. p. m.	0.9 to 180	
High speed spindle speeds	r. p. m.	3.6 to 720	
FEEDS			
32 boring feeds of main spindle	mm per rev.	0.065 to 4.5	0.0026" to 0.18" per rev.
32 boring feeds of high speed spindle	mm per rev.	0.016 to 1.12	0.00064" to 0.045" per rev.
16 milling feeds of spindle head and column	mm per rev	14 to 450	9/16" to 17" per rev
RAPID TRAVERSE			
Rapid traverse of main and high speed spindle approx.	mm per min.	2030-910	6'8"/3' per min.
Rapid traverse of spindle head and column approx.	mm per min.	880	2'10" per min
SCREWCUTTING			
22 metric threads with pitches of	mm	0.5 to 12	
32 Whitworth threads with	t. p. i.	28 to 1	
DRIVE			
Main motor: output	kW	25	
speed	r. p. m.	960	
Motor for spindle head and column feed and for rapid traverse: output	kW	15	
speed	r. p. m.	1405	
WEIGHT OF MACHINE			
with standard equipment, approx.	kg	69000	152000 lbs

STANDARD EQUIPMENT

Complete electrical equipment of machine, high speed spindle with drive, screwcutting equipment, cooling equipment with electric motor driven pump, set of spanners for attendance, set of indicating plates and tables on machine, operator's instruction booklet.

SPECIAL EQUIPMENT

BACK REST with BED			
Movement of back rest on bed	mm	1800	5'11"
Vertical movement of boring bar support on column	mm	3450	11'4"
Motor for movement of column on bed: output	kW	5.5	
speed	r. p. m.	1420	
Motor for movement of boring bar support on column: output	kW	1.8	
speed	r. p. m.	2800	
Weight of back rest	kg	8500	18760 lbs

WHEN ORDERING, PLEASE, STATE THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS

The machines are continuously being improved upon. The particulars given in the prospectus are therefore not binding in detail

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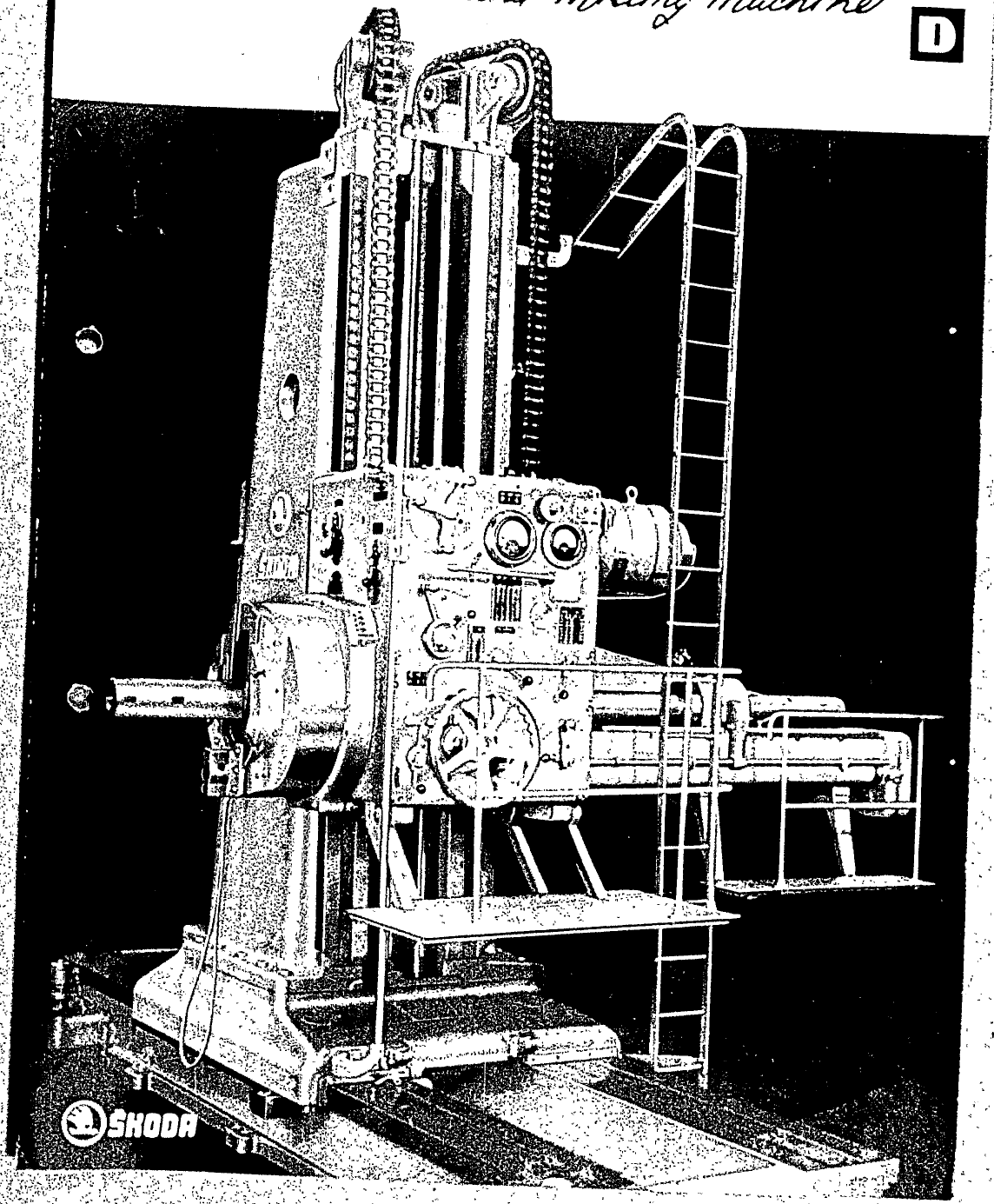
Horizontal Bed Plate Type Boring Drilling and Milling Machine

D



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TYPE HVF 160 D HORIZONTAL BED PLATE BORING DRILLING AND MILLING MACHINE

The machine is intended for drilling, boring, reaming, milling and screwcutting. It is particularly well-suited for work on big and heavy objects. These are clamped to a plate separate from the machine proper. The machine is built as a right-hand unit, i. e. with the column and spindle head at the right-hand side and the clamping plate with the workpiece at the left-hand side when viewed from the operator's post. By fitting a lifting shackle to the column the machine can be converted to the portable type because the unit proper, i. e. the column, spindle head and bed are not attached to the bed plate.

OUTSTANDING FEATURES

HIGH POWER MAIN MOTOR

WIDE RANGE OF SPEEDS of spindle, which runs in special adjustable anti-friction bearings, permits cemented carbide tipped tools to be fully utilized for boring as well as for milling.

ELECTRIC SPEED INDICATOR of spindle as well as of face plate.

INDEPENDENT SPINDLE AND FACE PLATE DRIVE affording most varied combinations of operations.

FACE PLATE WITH SLIDE for automatic facing provided with a small axial movement for adjustment of tool into the cut (in case a milling cutter is fitted to face plate).

CUTTING OF THREADS, metric as well as Whitworth, with current pitches.

ACCURATE SETTING of spindle, spindle head or column by means of precision gauges with verniers or by dial type error gauges.

FEEDS AND RAPID TRAVERSES of all parts of machine can be disengaged by limit switches except for boring feed of spindle which can be limited by adjustable stops.

ALL GEARS AND FEED SHAFTS running in anti-friction bearings.

CENTRAL CONTROL OF CONTROLS OF WHOLE MACHINE and convenient remote control of main motor by [illegible] from any position.

DESCRIPTION

THE DRIVE The machine is driven by a flange-mounted reversible squirrel cage electric motor provided with an Alfoo brake outfit. The load of the motor can be checked by means of an ammeter fitted to the spindle head.

THE SPINDLE HEAD is designed as a self-contained assembly with its own electric motor and complete drive of the spindle and face plate and of the feeds and rapid traverses. The speeds and feeds are changed by means of gears sliding on spline shafts running in anti-friction bearings throughout. The gears are hardened and those with higher peripheral speeds are ground.

A setting of the height of the spindle on the column, accurate within 0.05 mm (0.002") can be made by means of the vernier on the scale. Even more accurate settings are possible with the help of the dial-type error gauge.

THE SPINDLE runs in a special double-row, finely adjustable roller bearing. The hollow spindle is carried in an adjustable tapered bush. The spindle and face plate can run mutually entirely independently, i. e. they either run both at the same low speed or the spindle runs 16 times as fast as the face plate. This combination can be used to advantage for simultaneous boring by means of the spindle and machining of flanges by means of the face plate slide. The speeds of both spindles are indicated by an electric speed indicator.

THE FACE PLATE is keyed to a hollow spindle and provided with a slide for facing which moves independently of the spindle in either direction. The slide has its own rapid traverse, the extreme positions being limited by positive stops, the drive being protected against damage by a safety clutch.

The milling tools having been set in relation to the workpiece the face plate can be moved, by hand or power, about 50 mm (2") outward. The drive is protected in its extreme positions by a shear wedge.

THE FEEDS. There are two kinds of feeds: Boring feeds (in mm per revolution) acting upon the main spindle and face plate slide and milling feeds (in mm per minute) moving the spindle head vertically on the column and the column longitudinally on the bed. The main spindle feed can be limited by adjustable stops. The direction of feed of the face plate slide is independent of the direction of rotation of the spindle.

SCREWCUTTING. 22 metric and 32 Whitworth threads with current pitches can be cut on the machine. The feeding movement of the spindle is operated by a lead screw driven off the spindle through a gear box with change gears.

THE COLUMN is reinforced with densely spaced ribs. It encloses the counterweight of the spindle head. In the rear part of the column the easily accessible electrical equipment cabinet is fitted and also the box with change gears for screwcutting. The bottom part of the column rests on the bed on large guiding surfaces. The column is moved along the bed by means of a pinion and rack.

THE BED. The large guiding surfaces of the bed afford perfect guiding for the column even under the heaviest loads.

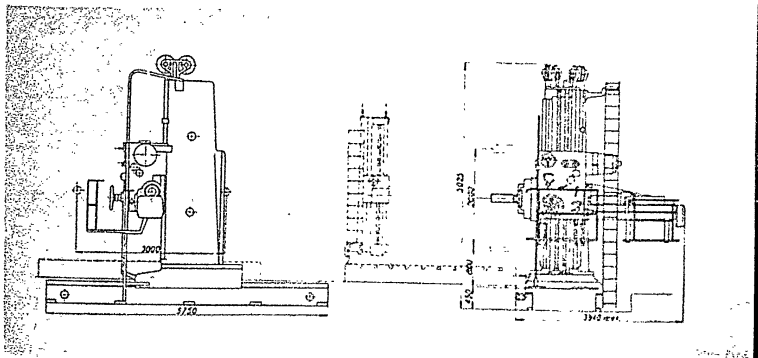
THE LUBRICATION of the spindle head is a central splash lubrication with the oil being circulated by a gear type pump. The operation of the pump is checked by a lubrication guard with a signal light. The column on the bed and the guideways of the spindle head are also centraly pressure lubricated by means of a hand operated lubricator. The mechanism in the bottom part of the column is lubricated by an oil bath.

THE COOLING SYSTEM is a circulating system with a coolant tank arranged in the bed. The [illegible] lated by an electric motor driven centrifugal pump.

THE BACK REST is supplied only to special order. The boring bar support is moved on the [illegible] rest mechanically by an independent electric motor or by hand by a hand wheel by means of a [illegible] accurately aligned with the spindle with the help of the vernier on the scale or a dial [illegible]

THE CONTROLS of the machine are simple and conveniently laid out. The [illegible] push-buttons fitted on the spindle head and also on a portable hook on box. [illegible] adjustments and the sliding of gears a special electrical push button is provided on the [illegible] of which the machine is started and kept running only as long as the push button [illegible]

The controls of the clutches, of the engagement of speeds and feeds as well as the power feeds of the spindle, face plate, face plate slide, spindle head or column are [illegible] spindle head and marked by appropriate plates and tables which are easy to read.



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SPECIFICATION

D

Diameter of spindle	mm	60	[illegible]
Taper in spindle		[illegible]	
Maximum torque: on spindle	kg/m	[illegible]	[illegible]
on face plate	kg/m	[illegible]	[illegible]
Working Ranges:			
Maximum diameter of boring with boring spindle	mm	1000	[illegible]
Maximum diameter of facing with face plate slide	mm	1300	[illegible]
Maximum sliding movement of spindle: basic	mm	1200	[illegible]
additional	mm	600	[illegible]
Axial movement of face plate	mm	50	[illegible]
Vertical movement of spindle head	mm	2000	[illegible]
Minimum height of centre-line of spindle above bed	mm	800	[illegible]
Minimum height of centre-line of spindle above clamping plate (normal)	mm	410	[illegible]
Cross movement of column on bed	mm	3000 or 4500	9'10" or 14'9"
Diameter of face plate	mm	810	[illegible]
Height of bed	mm	410	[illegible]
Speeds:			
Spindle speeds arranged in 24 steps	r.p.m.	2.25 to 450	
Face plate speeds arranged in 12 steps	r.p.m.	2.25 to 48	
Feeds:			
16 boring feeds of spindle	mm per rev.	0.04 to 8	0.0016 to 0.[illegible] per rev.
8 milling feeds of head stock or column	mm per min.	18 to 450	0.72 to 18 per min.
16 feeds of face plate slide	mm per rev.	0.045 to 18	0.0018 to 0.72 per rev.
Rapid Traverses:			
Rapid outward movement of spindle	mm per min.	4500 or 560	15' or 1'10" per min.
Rapid traverse of spindle head or column	mm per min.	900	3' per min.
Rapid traverse of face plate slide	mm per min.	670	[illegible] per min.
Outward power movement of face plate	mm per min.	25	1" per min.
Screwcutting:			
22 metric threads with pitches of	mm	0.5 - 12	
32 Whitworth threads with	t.p.i.	28—1	
Drive:			
Main motor: output	kW	18	
speed	r.p.m.	949	
Dimensions and Weights:			
Floor space of machine:			
with 3000 mm (9'10") movement of column on bed, approx.	mm	5800 × 5750	19' × 18'10"
with 4500 mm (14'9") movement of column on bed, approx.	mm	5800 × 7250	19' × 23'9"
Weight of machine with standard equipment:			
machine with 3000 mm (9'10") movement of column on bed, approx.	kg	26500	58500 lbs
machine with 4500 mm (14'9") movement of column on bed, approx.	kg	27660	60800 lbs
Standard equipment:			
Complete electrical equipment, face plate with slide for facing of flanges, measuring set with 2 dial-type error gauges for horizontal and vertical precision measurements, set of change gears for screwcutting, cooling equipment with electric motor driven pump and piping, indicating plates on machine, grease gun, spanners and cranks for maintenance, operator's instruction booklet.			
Special equipment:			
Back rest with bed:			
Movement of back rest on bed	mm	1800	5'11"
Vertical movement of boring bar support on column	mm	2000	6'6"
Motor for movement of column on bed: output	kW	2	
speed	r.p.m.	1420	
Motor for movement of boring bar support on column:			
output	kW	1.2	
speed	r.p.m.	2800	
Weight of back rest	kg	5200	11[illegible] lbs

WHEN ORDERING, PLEASE STATE THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS

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ŠKODA HORIZONTAL TABLE TYPE BORING AND MILLING MACHINE

HVF 160 S

The machine is intended for drilling, boring, reaming and threading operations on big machinery parts, etc. It has a fixed column, a table with a longitudinal, transverse and circular movement and a back rest with a boring bar support which makes it particularly suitable for applications where boring operations predominate.

The machine is normally built as a right hand unit (i. e. with the column and head at the right hand side and the table at the left hand side).

OUTSTANDING FEATURES

High output.

High speed of spindle running in special adjustable anti-friction bearings. This arrangement permits cemented carbide tipped tools to be fully utilized for boring as well as for milling.

Electric speed indicator of spindle as well as face plate speeds.

Independent spindle and face plate drive affording most varied combinations of operations.

Face plate with facing slide rest for automatic facing.

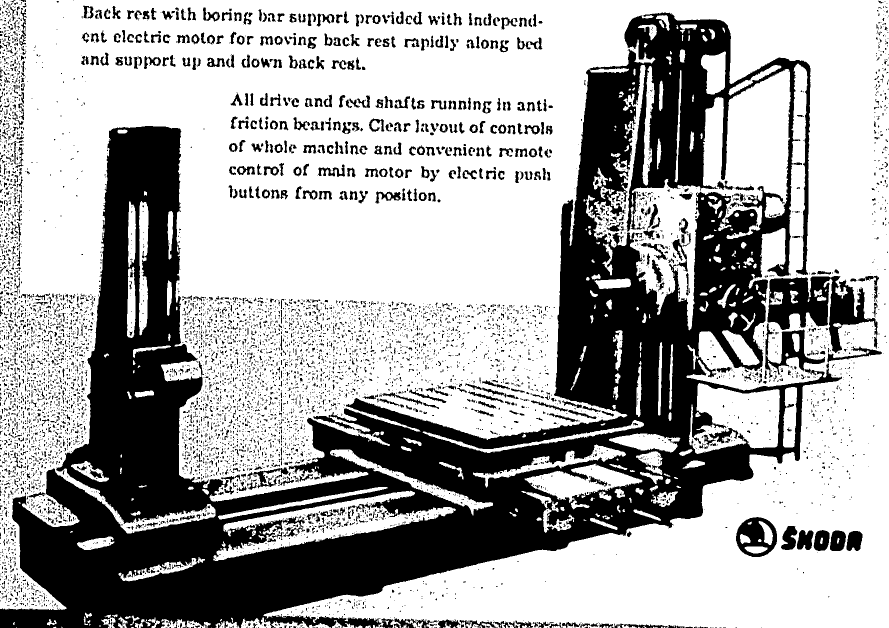
Cutting of metric and Whitworth threads of all current sizes.

Accurate setting of spindle, spindle head, table and boring bar support on back rest by means of precision scales with verniers or by dial-type error gauges.

Feeds and rapid travels of all parts of machine can be limited by limit switches. Boring feed of spindle can be disengaged by means of adjustable stops.

Back rest with boring bar support provided with independent electric motor for moving back rest rapidly along bed and support up and down back rest.

All drive and feed shafts running in anti-friction bearings. Clear layout of controls of whole machine and convenient remote control of main motor by electric push buttons from any position.



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DESCRIPTION

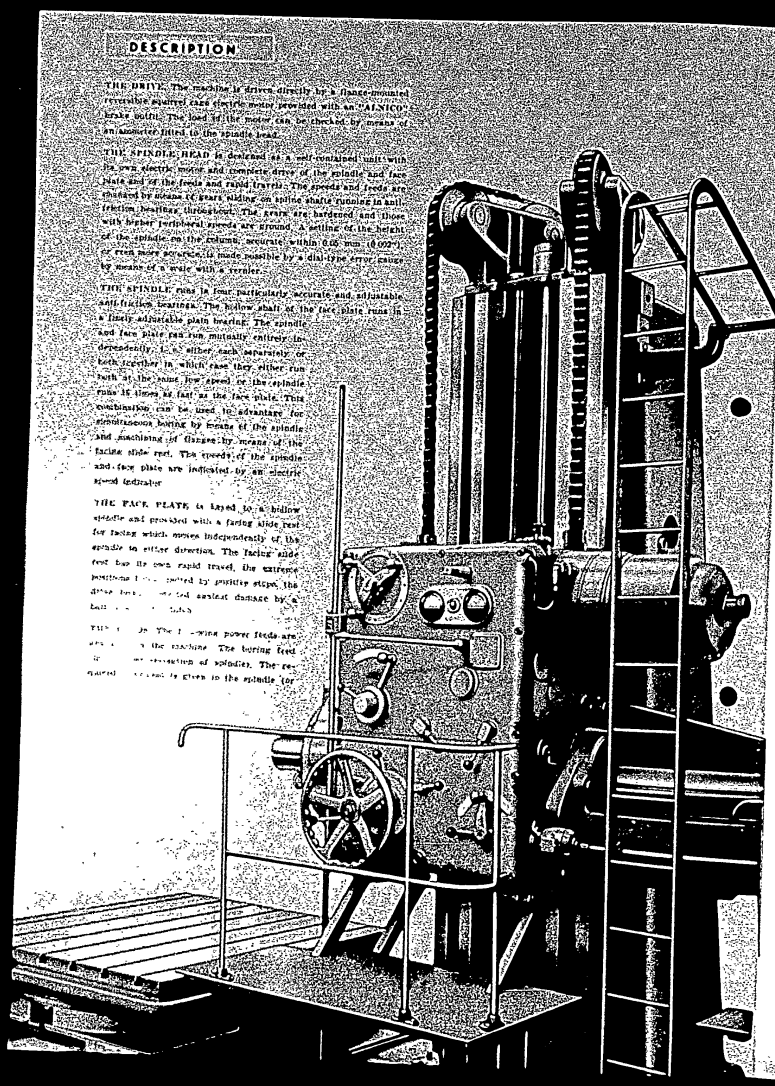
THE DRIVE. The machine is driven directly by a flange-mounted reversible squirrel cage electric motor provided with an "ALNICO" brake outfit. The load of the motor can be checked by means of an ammeter fitted to the spindle head.

THE SPINDLE HEAD is designed as a self-contained unit with its own electric motor and complete drive of the spindle and face plate and of the feeds and rapid travels. The speeds and feeds are changed by means of gears sliding on spline shafts running in anti-friction bearings throughout. The gears are hardened and those with higher peripheral speeds are ground. A setting of the height of the spindle on the column, accurate within 0.05 mm (0.002"), or even more accurate, is made possible by a dial-type error gauge by means of a scale with a vernier.

THE SPINDLE runs in four particularly accurate and adjustable anti-friction bearings. The hollow shaft of the face plate runs in a finely adjustable plain bearing. The spindle and face plate can run mutually entirely independently, i. e. either each separately or both together in which case they either run both at the same low speed or the spindle runs 16 times as fast as the face plate. This combination can be used to advantage for simultaneous boring by means of the spindle and machining of flanges by means of the facing slide rest. The speeds of the spindle and face plate are indicated by an electric speed indicator.

THE FACE PLATE is keyed to a hollow spindle and provided with a facing slide rest for facing which moves independently of the spindle in either direction. The facing slide rest has its own rapid travel, the extreme positions [illegible] by positive stops, the drive [illegible] against damage by a [illegible]

THE [illegible] The [illegible] power feeds are [illegible] the machine. The boring feed [illegible] of spindle). The required [illegible] is given to the spindle (or



to the table slide). The spindle feed can be disengaged by adjustable stops. The milling feed (in mm per minute) by means of which the spindle head is moved vertically or the table crosswise. The feed of the facing slide rest (in mm per revolution of face plate). This feed is independent of the direction of rotation of the spindle.

THREADING is done by a sliding movement of the boring spindle. The movement is obtained from a lead screw with a positive drive from the spindle through a gear box with 17 change gears sufficient for cutting 22 metric and 22 Whitworth threads of the usual pitches.

THE COLUMN is box-shaped, of a sturdy design and reinforced with densely spaced ribs. It encloses the counter-weight of the spindle head. In the rear part of the column the easily accessible electrical equipment cabinet is fitted and also the box with change gears for threading.

THE BED is of ample width and reinforced with ribs. The large guiding surfaces afford perfect guiding and a firm base for the column and for the large table even with the heaviest loads. The bed is provided with holes for the foundation bolts and with levelling screws for the erection of the machine on the foundation.

THE TABLE has a transverse movement in the guideways of the table slide which in turn moves longitudinally on the bed being driven by a pinion and rack. The slide can be rotated either mechanically or by hand and set accurately in four mutually perpendicular positions by means of folding stops or approximately at any angle by means of a large circular scale on the circumference of the table.

An accurate setting of the longitudinal as well as transverse position of the table is afforded by scales with verniers and if necessary by a dial type error gauge same as the setting of the spindle head. The extreme positions of the table slide and cross slide are secured by limit switches.

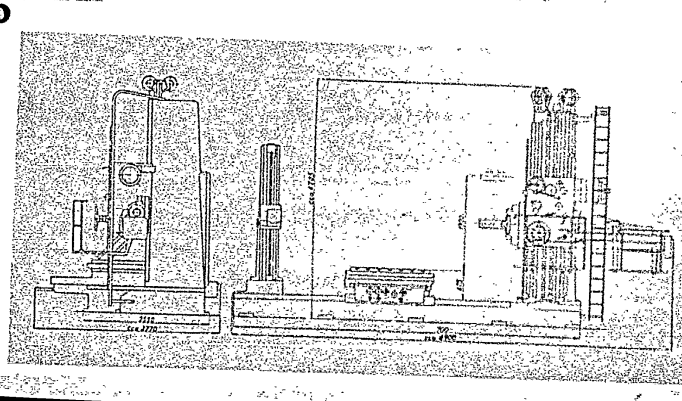
THE BACK REST is moved on the bed by its own electric motor independent of the table. The boring bar support is similarly mechanically moved on the vertical guideways of the back rest column. The support is set accurately by hand by means of a scale with a vernier.

THE LUBRICATION of the spindle head is a central splash lubrication with the oil being circulated by a gear type [illegible] operation of the pump is checked by a lubrication guard with a signal light. Similarly the table is centrally pressure [illegible] means of a hand operated lubricator.

THE COOLING SYSTEM is a circulating system with a coolant tank arranged in the bed. The coolant is circulated [illegible] driven centrifugal pump.

THE CONTROLS of the machine are simple and conveniently laid out. The main motor is controlled [illegible] on the spindle head and also on a portable box with a long flexible cable. To facilitate changes [illegible] sliding of gears a special inching push button is provided on the spindle head by means of which the [illegible] kept running as long as the push button is being held depressed.

The controls of the clutches, of the engagement of speeds and feeds as well as the controls of all hand [illegible] spindle, face plate, facing slide rest, spindle head and table are suitably centralized on the spindle head [illegible] plates and tables.



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SPECIFICATION:

		Metric
Diameter of spindle	mm	160
Taper in spindle	metric	100
Maximum torque on spindle	kg cm	25 000
on face plate	kg cm	80 000
WORKING RANGES		
Maximum diameter of boring with boring spindle	mm	1000
Maximum diameter of facing with facing side rest	mm	1900
Maximum sliding movement of spindle		
— primary	mm	1250
— additional	mm	650
Vertical movement of spindle head	mm	1900
Height of centre line of spindle above table	mm	0—1900
Diameter of face plate	mm	810
Maximum distance, face plate to boring bar support	mm	4100
TABLE:		
Clamping surface	mm	1600 × 1800
Longitudinal movement	mm	2500
Transverse movement	mm	2000
SPEEDS:		
Spindle speeds arranged in 24 steps	r. p. m.	2.25—450
Face plate speeds arranged in 12 steps	r. p. m.	2.25— 45
FEEDS:		
Boring of spindle arranged in 16 steps	mm per rev.	0.04—8
of table arranged in 8 steps	mm per rev.	0.11—2.8
Milling of spindle head and table arranged in 8 steps	mm per min.	15—450
of facing slide rest arranged in 16 steps	mm per rev.	0.045—18
RAPID TRAVELS:		
Rapid travel of spindle	mm per min.	4500 or 360
Rapid travel of spindle head	mm per min.	900
Rapid travel of facing slide rest	mm per min.	870
Longitudinal rapid travel of table	mm per min.	1800
Transverse rapid travel of table	mm per min.	800
Circular rapid travel of table		
on diameter scale of 1800 mm	mm per min.	3600
or expressed in revolutions of table	r. p. m.	0.64
BACK REST:		
Motor for movement of back rest on bed and of boring bar support on back rest — output	kW	2.2
speed	r. p. m.	940
THREADING:		
72 metric threads with pitches of	mm	0.5—12
32 Whitworth threads with	turns per inch	28—1
DRIVE:		
Main motor — output	kW	18
speed	r. p. m.	940
DIMENSIONS AND WEIGHTS		
Floor space of machine	approx. mm	8800 × 3800
Weight of machine with standard equipment	approx. kg	35570

STANDARD EQUIPMENT

Complete electrical equipment, face plate with facing slide rest for facing of flanges, measuring set with 2 dial-type error gauges for horizontal and vertical precision measurements, set of change gears for threading, oiling equipment with electrically driven pump and piping, indicating plates on machine, grease gun, spanners and cranks for attendance, operating instructions booklet.

When ordering please always state the voltage available for the electric motors.

The machines are continuously being improved. The particulars given in the prospectus are therefore not binding in detail.

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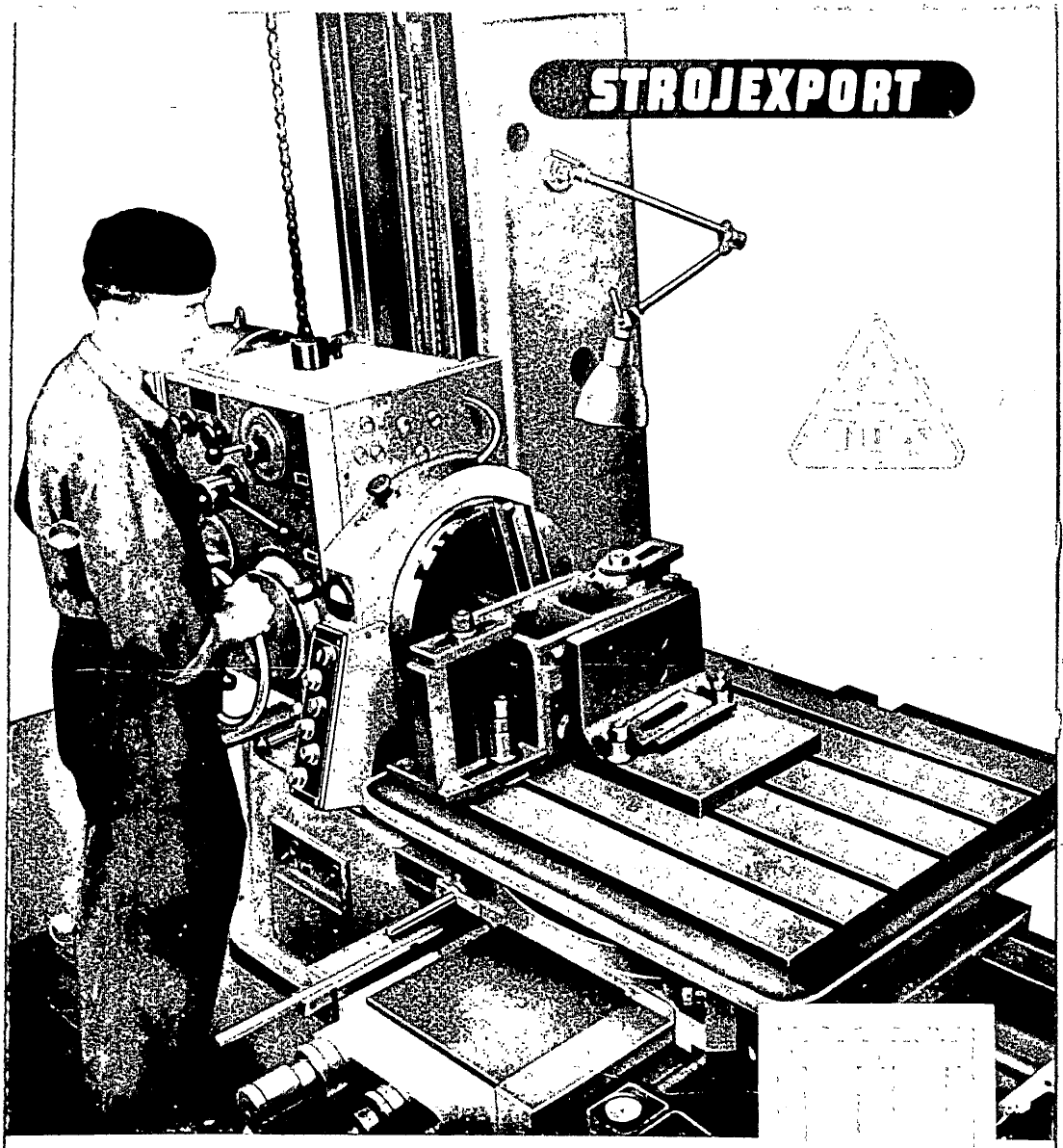

HORIZONTAL BORING MACHINE

TYPE

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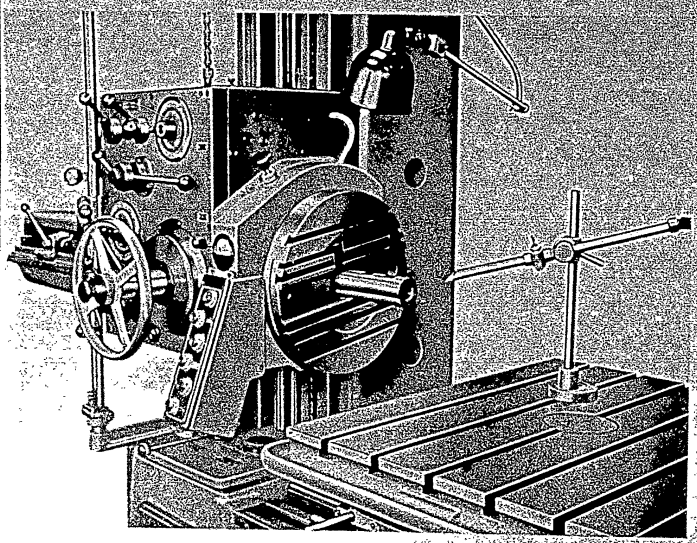

TYPE H 63 HORIZONTAL BORING MACHINE

This machine is designed and built for precision boring, drilling, milling, threading, reaming and facing, and meets every requirement of machine tool users, where precision work to close limits and smooth finish of the machined surface are of prime importance. Rigidity of construction and special care taken in selection of material as well as perfect workmanship ensure reliability in service and permanent accuracy of the machine.

Outstanding Features:

Enduring accuracy,
High production,
Wide speed and feed range,
Use of carbide tipped tools,
Smooth and quiet running at all speeds,
Ease of operation.

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Safety clutch against overload. A starting friction clutch which is interposed between the motor and the gear mechanism protects the machine against overload. If the table strikes an obstacle, the safety clutch is put into action and automatically releases the work feed and the rapid motions.

Table. The table is arranged for hand and power feed in the longitudinal and cross direction, as well as for circular feed. It is provided with accurately planed T-slots for clamping the work and in its centre with a centering hole for accurate location of the work or fixture.

Bed. The bed has wide, flat, accurately ground guides. It is adequately ribbed and enclosed at the top.

Column. The vertical guideways for the headstock are accurately ground, the right-hand guide being especially wide. Thus precision guiding of the headstock is ensured even after a long time of service.

Boring Bar Support. The boring bar support for supporting long boring bars is longitudinally adjustable by hand. The bar support bearing can be vertically moved by a handcrank and finely adjusted by a hand-wheel.

Lubrication. All bearings and gears in the headstock are lubricated by a geared pump. For inspecting the oil level an oil gauge and for the function of the pump an oil flow indicator are provided on the front of the Headstock. The bearing and contact surfaces of the slide and table are lubricated by grease guns.
The other oiling points are fitted with oilers located in plain view of the operator.

Electrical Equipment. The machine is driven by an asynchronous flanged type squirrel-cage motor. Starting, stopping and reversing is done by contactors controlled by push buttons on the front of the headstock. Push buttons serve for fine adjustment of the spindle of face plate when setting-up the machine.
The loading of motor is visible on the ammeter.
The motor is protected against overload by fuses and thermal protective relays. The machine can only be driven by a 3-phase A. C. for 380 volts, 50 cycles, with a zero conductor. Machines for other voltage and frequency can be supplied only exceptionally.

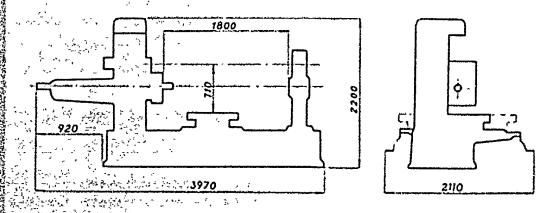
Cooling Attachment. The cooling attachment consisting of an electric pump and piping is supplied as optional equipment and is necessary for the machining of steel and cast steel. The coolant tank given for inside the bed is fitted with a filter.

STANDARD EQUIPMENT:

Attachment for vertical adjustment of headstock (without end measures and indicator), auto. feed in the cross adjustment of table (without end measures and indicator), attachment for vertical adjustment of bar support bearing, magnifying glass, set of spanners, grease gun, operating plate, operating instruction booklet.

OPTIONAL EQUIPMENT:

On request and at an extra charge the machines are supplied with the following attachments:
Cooling attachment with electric pump, leading elongation spindle support, clamping elongation spindle support, taper boring attachment, telescopic tool-block, single or double-arm star feed forming head, boring bars, spot light.



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FI 63

HEADSTOCK
The headstock embodies the driving, feeding and rapid traverse mechanisms. It is fully oil-tight and dirt-proof. The spindle speeds in 3 ranges in geometrical progression produce 18 speeds.
The lower and middle range are used for work with the face plate, the middle and high range for operations with the spindle. The 2-speed mechanism allows for independent drive of the face plate, mounted on a special separately arranged hollow spindle. The lower speeds are transmitted through a rim gear mounted directly in the face plate. This arrangement proves especially suitable for work with the facing head as well as when applying multiple tool heads. Another advantage is the possibility of machining by using the workspindle and the face plate simultaneously either at equal or different speeds. The direction of the spindle and face plate rotation is changed by reversing the motor.

SPINDLE SPEED CHANGE
The spindle speeds are changed by hand.

SPINDLE MOUNTING
The spindle is made of high-quality steel and on its bearing surfaces it is accurately ground. The facing head spindle and the hollow spindle are mounted in accurately adjustable bearings. The heating of the bearings is negligible even at the highest speeds.

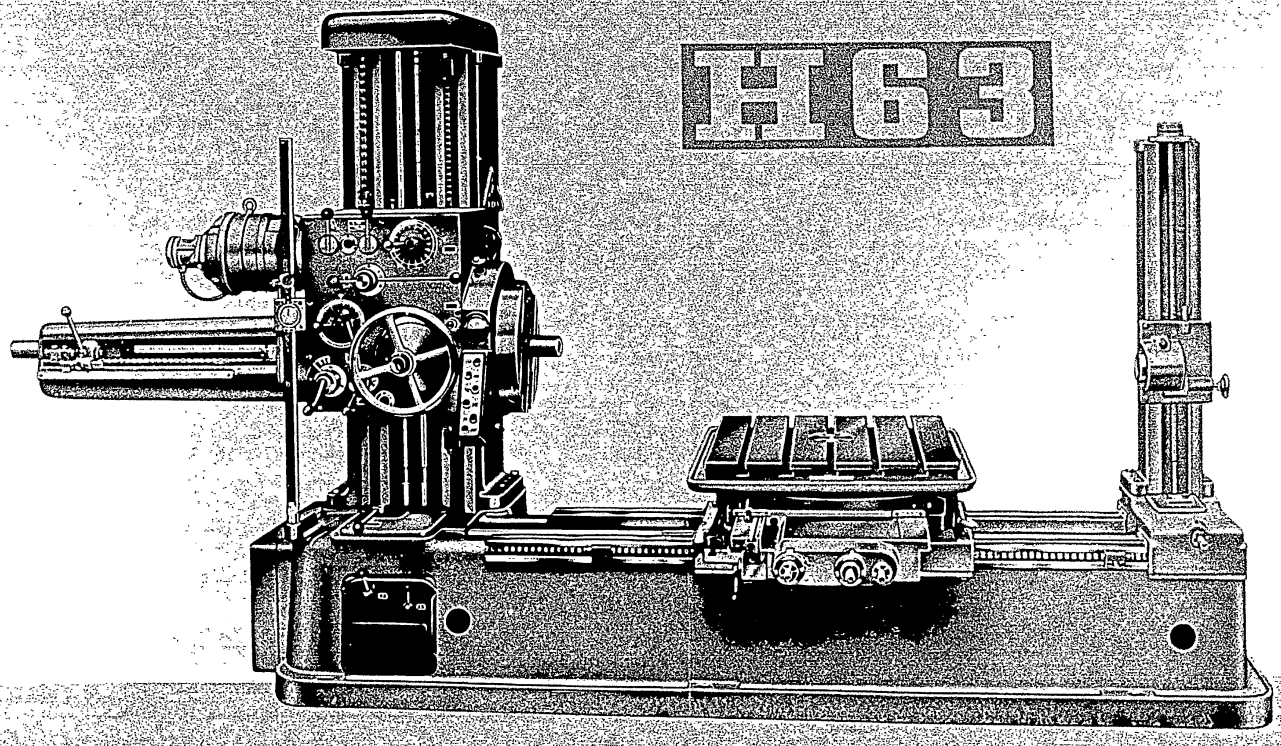
FEEDS
For drilling and boring 32 rates are available transmitted from the work spindle, for the spindle feed, vertical travel of headstock and for the longitudinal and cross travel of table. The same number and rates of feeds are provided also for the face plate. For milling 18 rates independent of the spindle feeds are available for spindle feed, vertical travel of head and longitudinal as well as cross travel of table.

FEED CHANGE
The spindle feeds are changed by hand.

RAPID MOTIONS
The machine is equipped with rapid motions in all directions. The rapid motions are independent of the work spindle and are always in a direction opposite to the direction of work feed to prevent in this way any damage to the work piece or tool. After automatic releasing of the work feed the rapid motion may be immediately put into action.

AUTOMATIC RELEASE OF THE WORK FEED AND RAPID MOTIONS
In either direction of the horizontal spindle feed, vertical headstock feed and longitudinal and cross feed of table is done by adjustable stops. These feeds and rapid motions are also released if the table strikes another obstacle.

THREAD CUTTING ATTACHMENT
The machine is arranged for cutting metric threads with a pitch of 0,25 to 12 mm and Whitworth threads of a pitch of 2½ to 120 threads per inch.



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SPECIFICATIONS

Diameter of spindle	mm	63	2½"
Taper in spindle	Morse No	4	4
Max. diameter for boring	mm	355	14"
Max. diameter for facing	mm	560	22"
Continuous/Additional feed to spindle	mm	560 280	22" 11"
Min./Max. distance centreline of spindle to top of table	mm	0 – 710	0 – 28"
Max. distance facing head to bar support	mm	1800	70⅞"
Diameter of facing head	mm	415	16⅜"
Centering dia. of facing head	mm	224 H7	224 H7 mm
Width of facing head centering surface	mm	6	¼"
Working surface of table (width × length)	mm	710 × 900	28" × 31,5"
Centering dia. of table	mm	140 H7	140 H7
Width of table centering surface	mm	6	¼"
Automatic cross travel of table	mm	800	31½"
Automatic longitudinal travel of table when in cross position	mm	900	35½"
Automatic longitudinal travel of table when in longitudinal position	mm	800	31½"
Number of spindle speeds		16	16
SPEED RANGE:			
Low speed band I speeds to spindle and facing head	r. p. m.	8 – 45	8 – 45
Middle speed band II speeds to spindle and facing head	r. p. m.	31,5 – 180	31,5 – 180
High speed band III speeds to spindle	r. p. m.	250 – 1400	250 – 1400
FEEDS:			
32 feeds to spindle	mm/rev	0,02 – 12	0,0008" – 5"
32 feeds to headstock	mm/rev	0,02 – 12	0,0008" – 5"
32 longitudinal feeds to table	mm/rev	0,02 – 12	0,0008" – 5"
32 cross feeds to table	mm/rev	0,02 – 12	0,0008" – 5"
32 feeds to facing head	mm/rev	0,02 – 12	0,0008" – 5"
32 circular feeds to table per spindle revolution (referred to dia. 1000 mm)		0,015 – 22	0,0006" – 0,87"
18 feeds to immobilized spindle	mm/min	12,5 – 600	½" – 24"
18 vertical feeds to headstock	mm/min	12,5 – 600	½" – 24"
18 longitudinal feeds to table	mm/min	12,5 – 600	½" – 24"
18 cross feeds to table	mm/min	12,5 – 600	½" – 24"
18 feeds to facing slide	mm/min	12,5 – 600	½" – 24"
18 automatic circular feeds to table on 1000 mm dia. (39⅜")	mm/min	22,5 – 1050	¼" – 41⅜"
Rapid traverse to spindle, headstock, table and facing slide (except circular movement of table)	mm/min	2400	95"
Rapid circular movement of table	r. p. m.	1,4	1,4
THREADS:			
18 metric threads, pitch	mm	0,25 – 12	
18 Whitworth threads	t. p. i.		2½ – 120
Motor: Speed	r. p. m.	1500	1500
Output	HP	5,5	5,5
Floor space required (width × length)	mm	2100 × 3900	83" × 154"
Net weight of machine with standard equipment	kg	4400	lbs 9 800
Weight of machine with packing	kg	5300	lbs 11 800
Weight of machine with seaworthy packing	kg	5360	lbs 12 000
Contents boxed	m³	21	cu. ft 740

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

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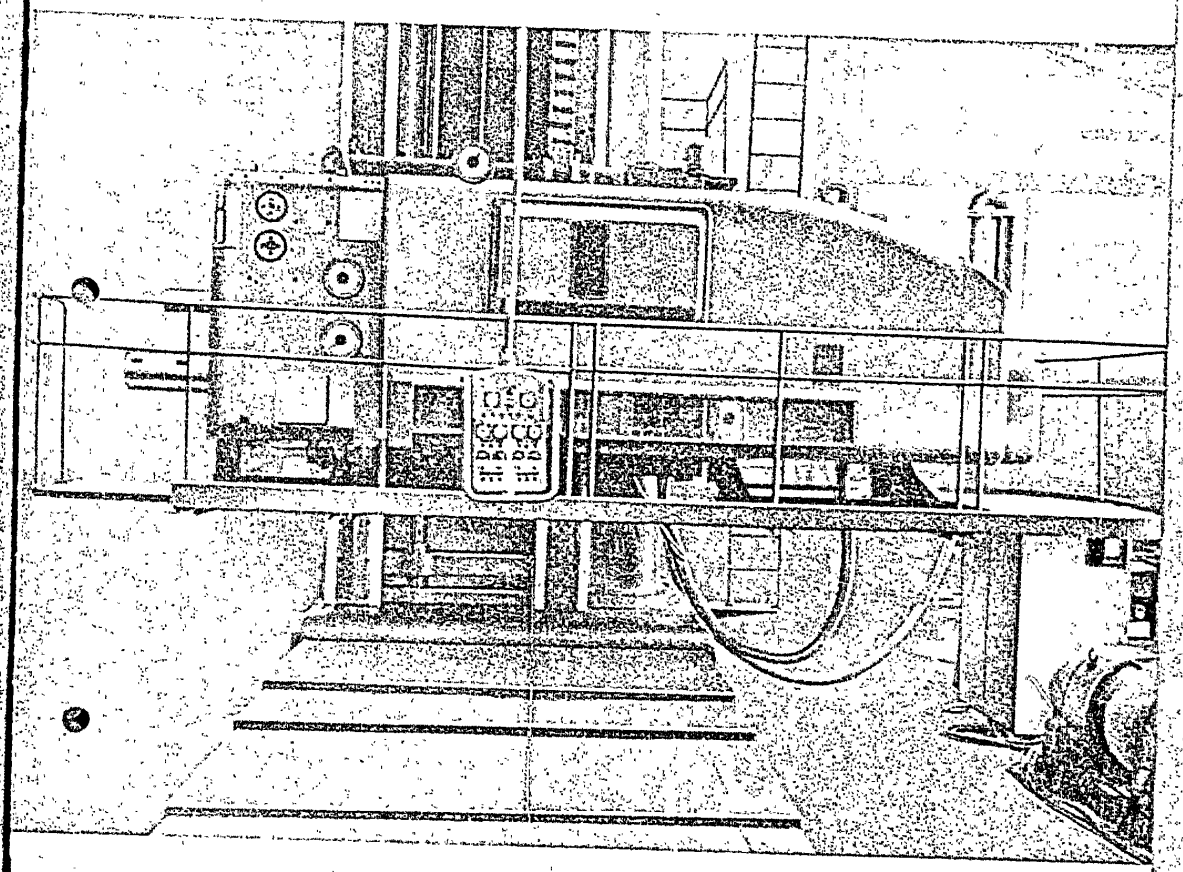

WD 250

HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

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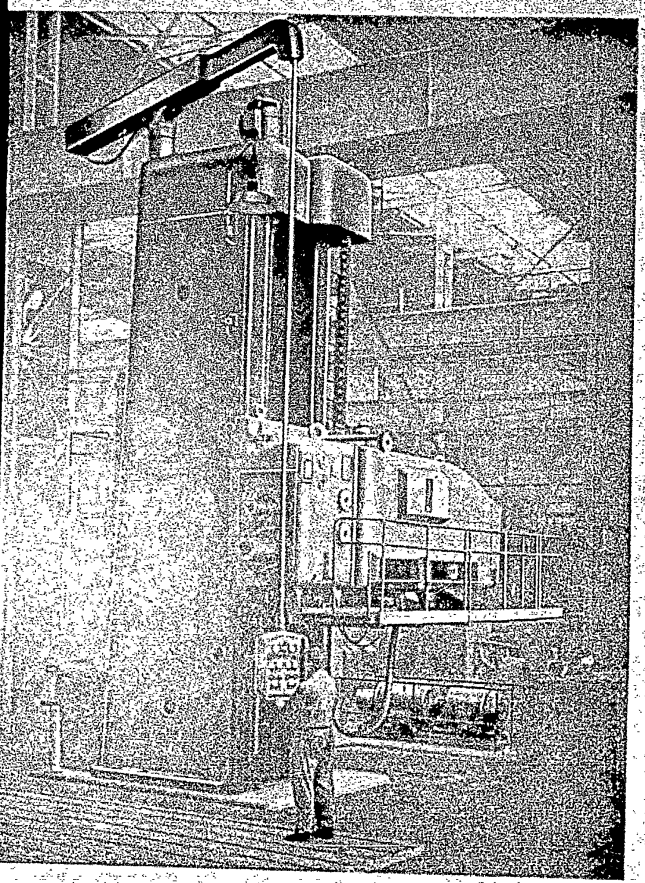

TYPE WD 250
HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

The machine is intended for drilling, boring and milling work on big and heavy workpieces.

Its design is based on entirely new principles, different from those of existing designs.

The machine has two spindles, a main spindle and a high speed spindle, arranged above each other. These high speed spindles extend readily extend the working range and predestinate use of the machine for high speed machining.

The machine is built as a right hand machine, i.e. with the [illegible] headstock at the right hand side and the clamping plate with the workpiece at the left hand side when seen [illegible] operating post.

OUTSTANDING FEATURES:

Main drive hydraulically operated with [illegible] control.

Horizontal sliding movement of head [illegible]

Infinite variation of speeds by means [illegible] of spindle speed.

Independent feed units.

Remote control of machine.

Automatic locking units.

Dial type remote measuring gauges.

Precision approach to given dimension by [illegible] on boring devices.

Automatic periodic lubrication of guiding surfaces.

Minimum wear of guiding surfaces.

Screwcutting equipment.

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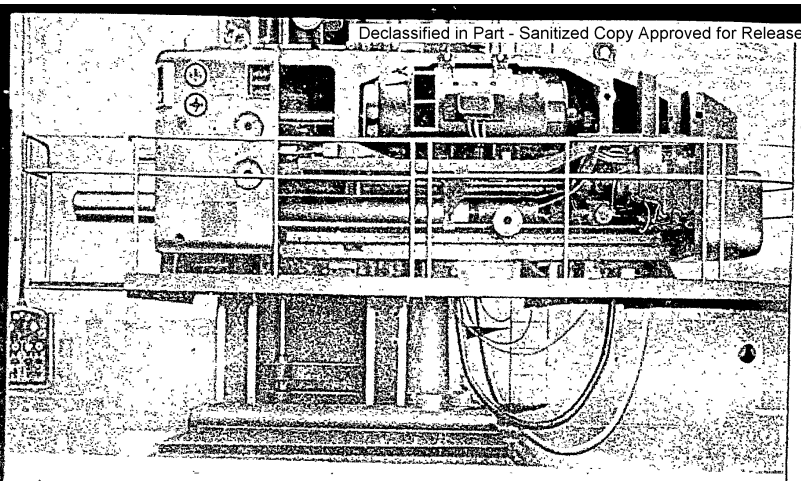


DESCRIPTION:

HEADSTOCK:

The headstock contains the motors for the drive of the spindles and feeds, the transmission and power distribution assemblies for the spindles, the screwcutting equipment, the disc type gauges for remote measuring as well as the clamping units for locking in position. The headstock has a main and a high speed spindle mounted above each other. The high speed spindle increases the working range and with it the utilization of the machine.

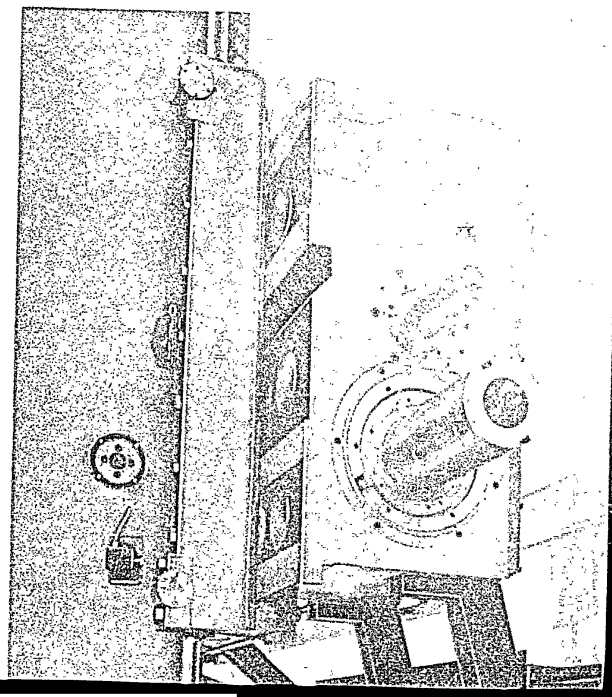
Both spindles are mounted in double-row roller bearings with an arrangement for fine adjustment of the play.

The headstock has a horizontal movement in the rear slide with which it moves vertically on the column. This design considerably increases the rigidity of the machine and also the precision of work including not only milling but also boring with the tool considerably forward. Another advantage of this arrangement of the headstock is that the main and high speed spindles move forward together and that the guide bearing need not be moved to obtain an additional depth of borne.

WD
250

FEEDS:

The machine is equipped with transverse power feeds on the column on the bed, vertical power feeds of the head-stock on the column and longitudinal power feeds of both spindles and the headstock. The kinds of feed enumerated above have their own feed unit fitted with a reversing rotator type electric motor. The machine is equipped, apart from the working feeds, with rapid traverses in all directions. The feeds are infinitely variable independently of the spindle speed. The feed units are mounted directly at the driving screws or pinions. Thus the long drive shafts and the corresponding transmissions are dispensed with. The engagement of gears is performed with electromagnetic control valves.



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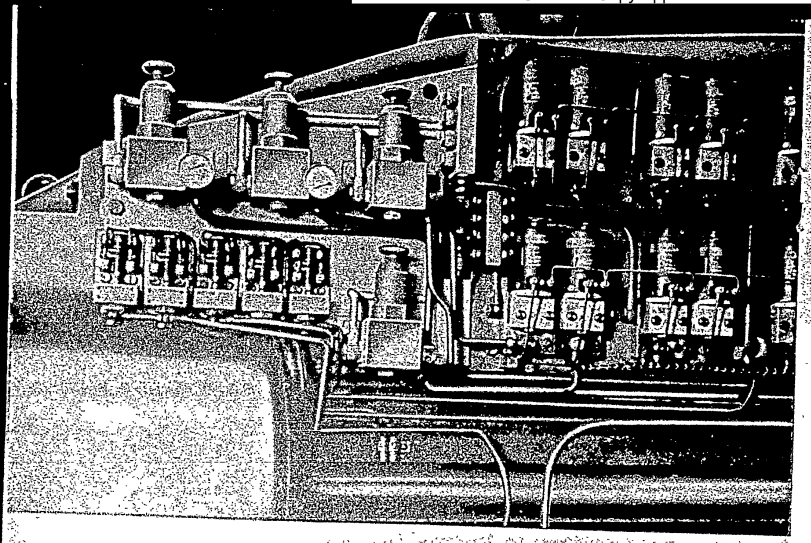


DRIVE:

A d. c. motor with infinitely variable speed control is used for the main drive. It is fed by a Ward-Leonard set with a 1 : 10 range of control. This range is increased to 1 : 200 by a three-speed transmission.

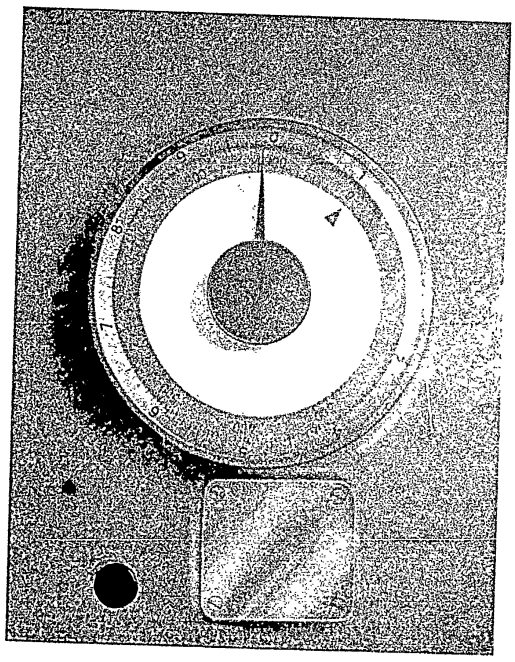
The engagement of the gears is pneumatic with electromagnetically operated distribution valves. When the drive is switched off braking by counter-current takes place automatically.

REMOTE CONTROL OF MACHINE:

The machine has not a single hand operated control element. The entire control is centralized in a suspended push-button box the setting of which in the required position in the horizontal as well as vertical direction is also electrically operated. The panel of this box carries the levers, push-buttons, tachometers and signal lights. These controls operate electromagnetic valves of the pneumatic servo-cylinders for the sliding of gears, for the locking of moving parts of the machine by means of special locking units, for pre-selection, starting and stopping of feeds and rapid traverses and for the setting of the required speeds or feeds by servomotors in accordance with the tachometer.

DISC TYPE REMOTE MEASURING GAUGES:

The inconvenient and inaccurate rod type gauges with verniers used in the past have been replaced by disc type gauges affording a reading, with an accuracy of [illegible] mm, of the distance through which both spindles and the headstock slide travel in the horizontal [illegible] the head stock on the column vertically and the column crosswise on the bed.



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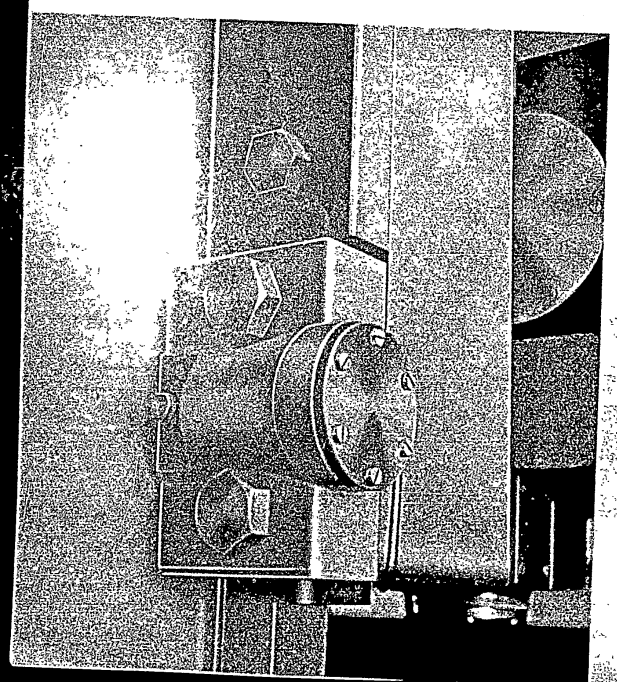
SETTING OF TOOL:

An accurate setting of the tool in the cut is made possible by the inching equipment. The commutator motors for the feeds run only as long as the appropriate push-buttons are held depressed and thus permit the tool to be set in the desired position with an accuracy of 0,02 mm.

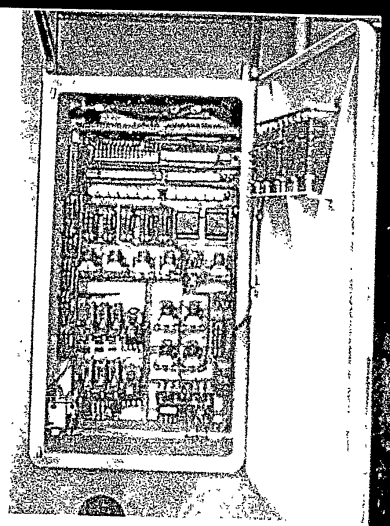
AUTOMATIC LOCKING UNITS:

All moving parts of the machine are fitted with locking units which secure them in position. Only those units are unlocked which belong to a part of the machine the feed of which happens to be in operation.



LUBRICATION:

The transmission in the headstock as well as in the feed units is lubricated by circulation by separate lubricating oil pumps the operation of which is checked by means of signal lights. The headstock and all feed units are lubricated by pressure pumps which are started together with the corresponding feed. The main guiding surfaces are periodically automatically lubricated by pumps at intervals which may be set as required by means of timing relays.



MINIMUM WEAR OF GUIDING SURFACES:

To prevent wear or seizing of guiding surfaces the guideways of the bottom of the column are lined with sliding plates of a synthetic resin base material. In addition to that the guideways on the bed are protected by sliding covers. The headstock slide moves on the column on hardened and ground steel bars screwed to the column.

SCREWCUTTING.

The main spindle is fitted with a screwcutting equipment [illegible] headstock through a gear box with change gears on a quadrant. [illegible] cutting.

COLUMN:

The column is box shaped and generously stiffened with ribs. The [illegible] in the hollow of the column. The cabinets with the electrical [illegible] the column. The movement of the column on the bed is operated by means of [illegible]

BED:

The bed is of ample width and provided with wide guideways which afford [illegible] the column even under the heaviest load.

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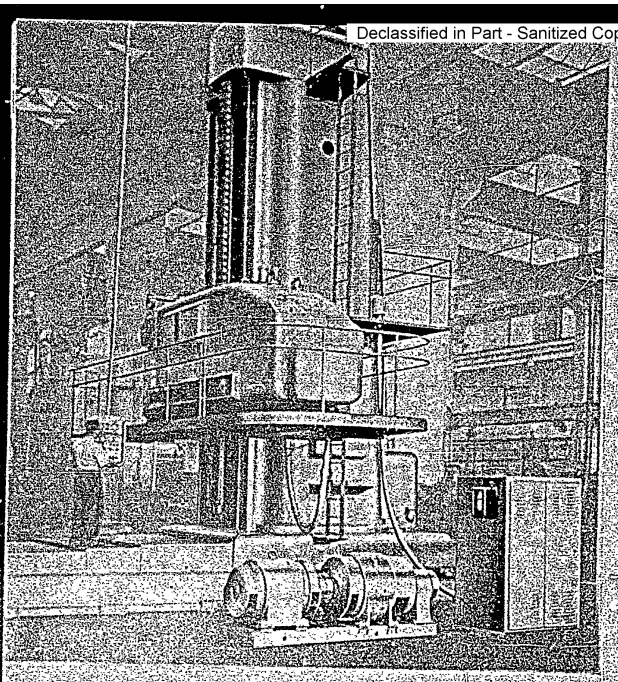


COOLING:

The cooling is done by a circulating system. The coolant is circulated by an electric motor driven centrifugal pump with a piping through which the coolant is supplied to the point of work from a tank arranged apart from the machine.

THE BACK REST:

The back rest consists of a bed, which is set up on the clamping plate, and a column with the boring bar supports. The rapid traverse of the column on the bed and of the boring bar support on the column is power operated, both being equipped with an independent electric motor. The fine adjustment is made by hand. The setting of the distance is indicated by disc type remote reading gauges of an accuracy of 0,02 mm.

STANDARD EQUIPMENT:

Operating instructions, name plates, set of spanners, grease gun, wedges, ejectors, tool cabinet, screwcutting equipment.

OPTIONAL EQUIPMENT:

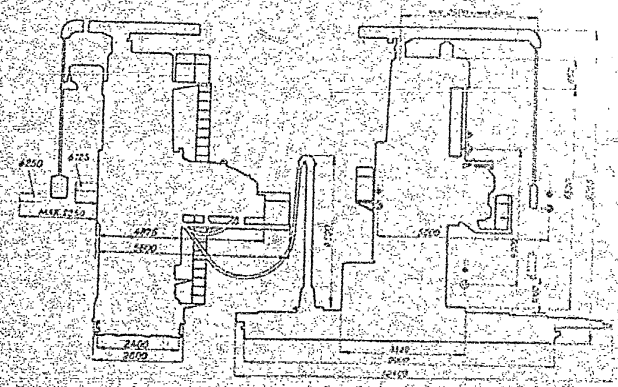
I. Electrical Equipment: a) of machine
b) of back rest
c) of cooling equipment
d) of circular table
e) of face plate

II. a) back rest
b) cooling equipment
c) circular table
d) bed plate

III. Attachments: a) face plate
b) drilling and milling at an angle, in three designs (sizes)
c) surface grinding
d) hollow grinding
e) drilling of tapered holes
f) extensions for attachments
g) optical equipment for setting of back rest

IV. Tools: a) boring bars with bushes for back rest
b) tool holders
c) boring heads
d) milling heads
e) milling arbours
f) universal milling heads

V. a) Set of spare parts for mechanical parts of machine
b) Set of spare parts for electrical equipment.



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SPECIFICATION:

WD 250

Diameter of main spindle	mm 250	9 27/32"
Diameter of high speed spindle	mm 125	4 29/32"
Taper in main spindle	Metric 140	
Taper in high speed spindle	Metric 80	
Maximum torque on main spindle	kgcm 300 000	21700 ft.-lbs
Maximum torque on high speed spindle	kgcm 45 000	3250 ft.-lbs
Maximum depth of boring with main spindle	mm 2250	7'4 1/2"
Maximum depth of boring with high speed spindle	mm 630	2' 3/4"
Sliding movement of headstock	mm 500	1' 5/8"
Vertical movement of headstock on column	mm 4000	13'1 1/2"
Travel of column on bed	mm 5000	16'4 3/4"
Main spindle speeds	r. p. m. 2 to 400	
High speed spindle speeds	r. p. m. 6.25 to 1250	
Drilling feeds (main spindle, high speed spindle, slide), infinitely variable, per minute	mm 0.8 to 780	1/32" to 2'6 3/4"
Milling feeds (headstock — vertical, column — horizontal) infinitely variable, per minute	mm 0.8 to 780	1/32" to 2'6 3/4"
Rapid traverses, per minute	mm 1200	4'
Screwcutting by means of drilling spindle:		
21 metric threads with pitches of	mm 0.75 to 12	—
32 Whitworth threads	t. p. i. —	28 to 1
Output of main motor	kW 75	
Output of commutator motor for milling feeds (at maximum speed)	kW/max. r. p. m. 8/3150	
Output of commutator motor for drilling feeds (at maximum speed)	kW/max. r. p. m. 4.4/3120	
Floor space required by machine	mm 12 500 × 6000	41' × 19'9"
Height of machine	mm 9300	30'7"
Weight of machine	kg 105 000	231 500 lbs

In ordering, specify voltage, phase and frequency of power supply.

The machines are continuously being improved upon.

The particulars in the prospectus are not binding in detail.

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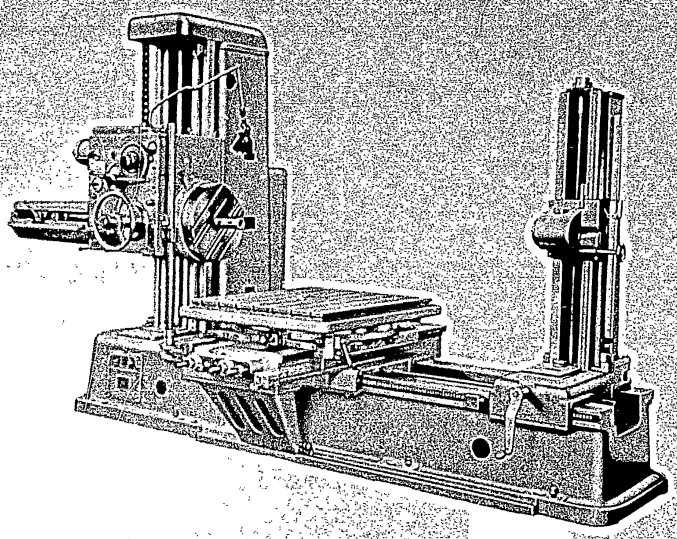


Horizontal Boring Machine Model

H80

The machine is designed and built for Precision Boring, Drilling, Milling, Threading, Reaming and Facing, and meets every requirement of machine tool users, where precision work to close limits and smooth finish of the machined surface are of prime importance. Rigidity of construction and special care taken in selection of material as well as perfect workmanship ensure reliability in service and permanent accuracy of the machine.

Outstanding features: Enduring accuracy - high productive ability - wide speed and feed range - use of carbide tipped tools - smooth and quiet running at all speeds - ease of operation.

TOS

Description

Headstock

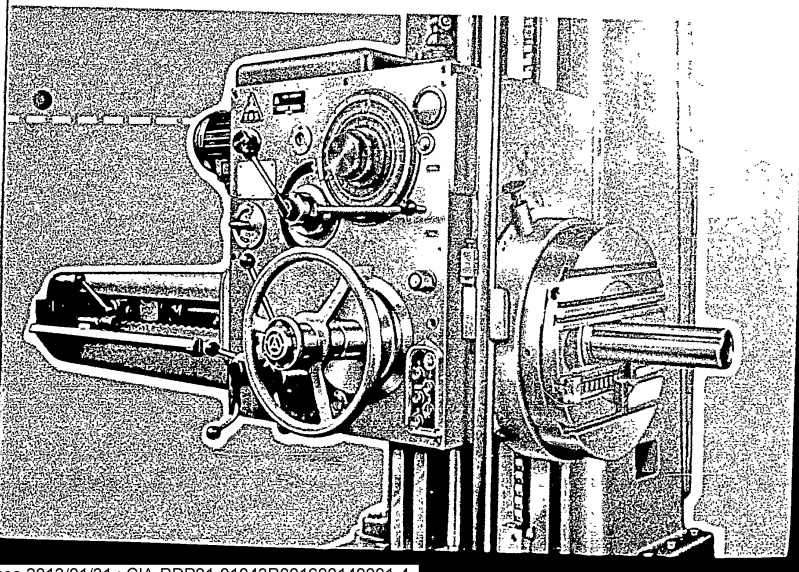
The headstock embodies the driving, feeding and rapid traverse mechanisms. It is fully oiltight and dirtproof. The spindle speeds in 3 ranges in geometrical progression produce 18 speeds

The Number of Spindle Speeds per Minute in each range is as follows

Lower range for spindle and face plate	5,6	8	11,2	16	22,4	31,5
Middle range for spindle	22,4	31,5	45	63	90	125
for face plate	26,5	37,5	53	75	105	150
High range (for spindle only)	180	250	355	500	710	1000

The lower and middle range are used for work with the face plate, the middle and high range for [illegible] with the spindle. The speed mechanism allows for Independent Drive of the Face Plate mounted on a spec[illegible] separately arranged hollow shaft. The low speeds are transmitted through a rim gear mounted direct[illegible] the face plate. This arrangement proves especially suitable for work with the facing head as well as when applying multiple tool heads. Another advantage is the possibility of machining by [illegible] and the face plate simultaneously, either at equal or different speeds. The direction of the spindle [illegible] plate rotation is changed by reversing the motor.

The machine is fitted with electric speed selection for automatic spindle speed change. The [illegible] for the subsequent operation is set by adjusting the speed selection dial during [illegible] and engaged at the required moment by depressing a pushbutton. Thus the time [illegible] is reduced to a minimum. The speed changing mechanism is driven by an independ[illegible] abling the speeds to be changed also while the spindle is at rest



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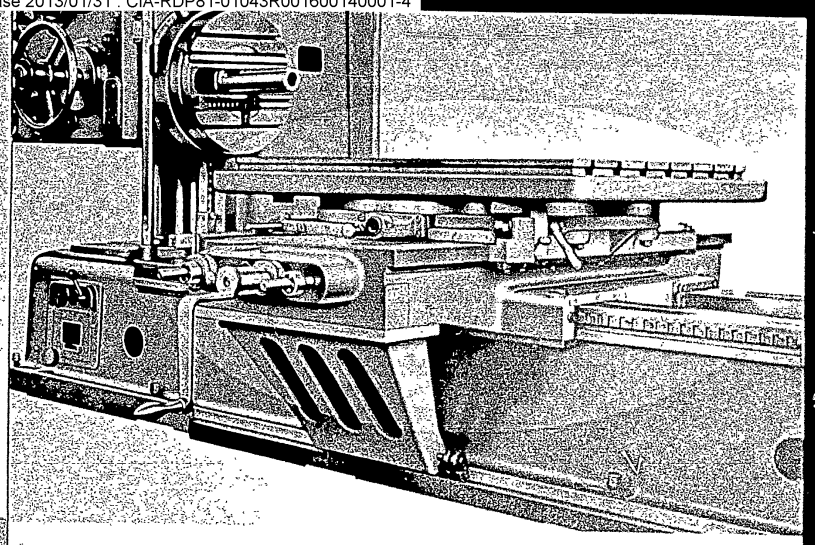
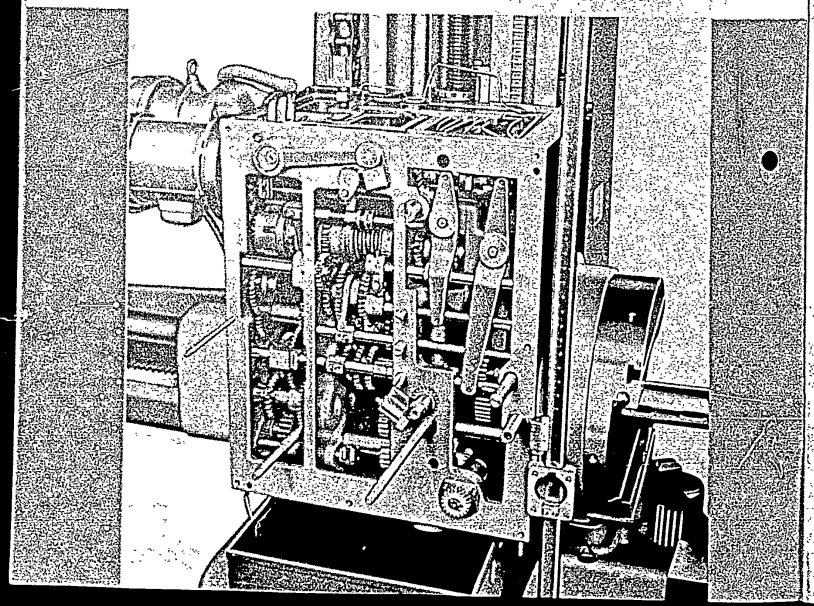
Feeds

For drilling and boring 32 rates are available transmitted from the work spindle and ranging from 0.02 to 12 mm/rev. for the spindle feed, vertical travel of headstock and for longitudinal and cross travel of table. The same number and rates of feed are provided for the face plate. For milling, 18 rates for spindle feed, vertical travel of head and longitudinal as well as cross travel of table are available, independent of the spindle rotation and ranging from 12.5 to 600 mm per minute. The feed change is automatic.
The machine is equipped with rapid motions in all directions. The rapid motions are independent of the work spindle rotation and act always in a direction opposite to the work feed, thus eliminating any damage to the work or tool. The rapid motion may be engaged automatically immediately after releasing the work feed.
Automatic release of work feeds and rapid motions in both directions of the horizontal spindle feed, vertical feed of headstock and longitudinal as well as cross feed of table are accomplished by adjustable stops.

Thread Cutting Attachment

The machine is arranged for cutting metric threads with a pitch of 0.25 to 12 mm and Whitworth threads of a pitch of 2 to 120 threads per inch.
The machine is fitted with a starting friction clutch against overload which is interposed between the motor and the gear mechanism. If the table strikes an obstacle, a safety clutch is put into operation and automatically disengages the working feed or the rapid traverse.





Table

The table is arranged for hand and power feed in the longitudinal and cross directions. The cross feed. The cross ways of the longitudinal slide are reinforced by special supports to prevent any of distortion of the table in its extreme cross positions even at maximum load.
The table is provided with accurately planed T-slots for clamping the work and in the centre a hole for accurate location of the work or fixture.

Bed

The bed has wide, flat, accurately ground guides. It is adequately ribbed and enclosed at the top.

Column

The vertical guideways for the headstock are accurately ground, the right-hand guide being especially wide. Thus precision guiding of the headstock is ensured even after a long time of service.

Boring Bar Support

The boring bar support for supporting long boring bars is longitudinally adjustable by hand. The bar support bearing can be vertically moved by a handcrank and finely adjusted by a handwheel.

Lubrication

All bearings and gears in the headstock are lubricated by a geared pump. For inspecting the oil level an oil gauge and for the function of the pump an oil flow indicator are provided on the front of the headstock.
The bearing and contact surfaces of the slide and table are lubricated by oil guns.
The other oiling points are fitted with oilers located in plain view of the operator.

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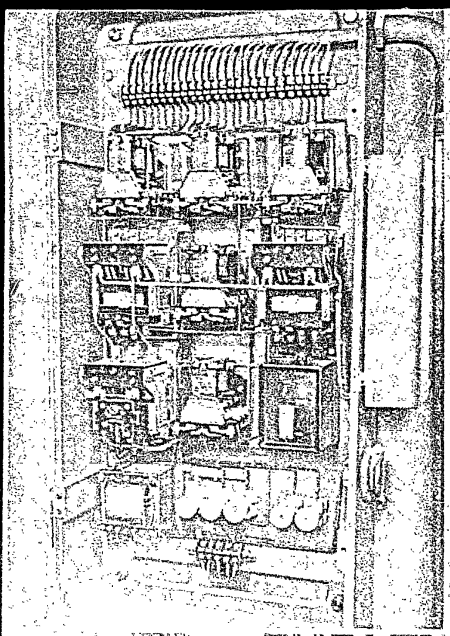


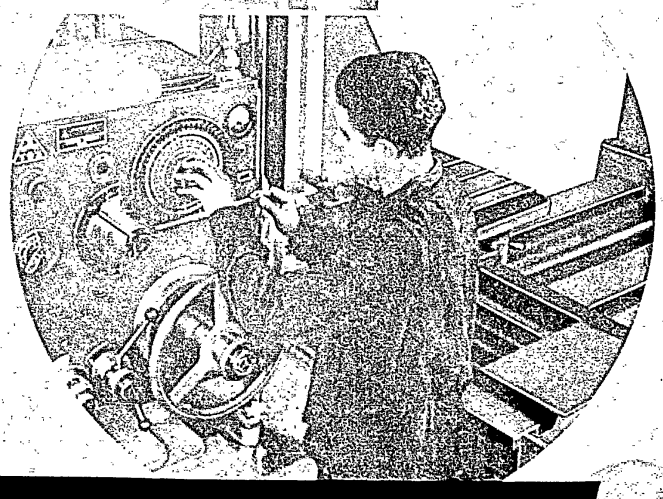
Electrical Equipment

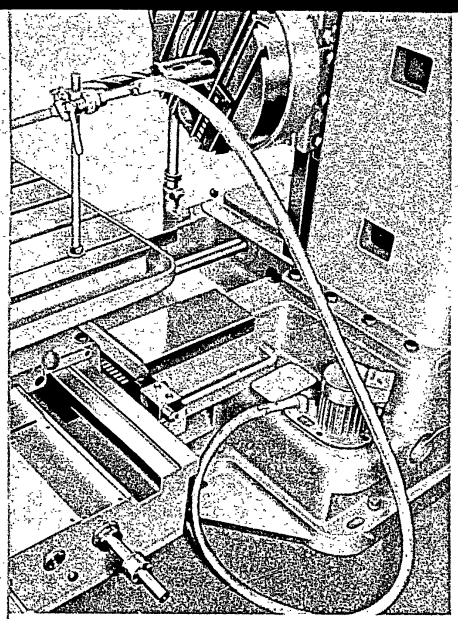
The machine is driven by an asynchronous flanged type electric motor. Starting, stopping and reversing is by contactors controlled by pushbuttons on the front of the headstock. Pushbuttons serve for fine adjustment of the spindle or face plate when setting-up the machine.

The loading of motor is visible on the ammeter.

The motor is protected against overload by fuses and thermal protective relays.

The machine can only be driven by a 3-phase A. C. for 380 volts, 50 cycles, with a zero conductor. Machines for an abnormal voltage and frequency can only be supplied on special order.



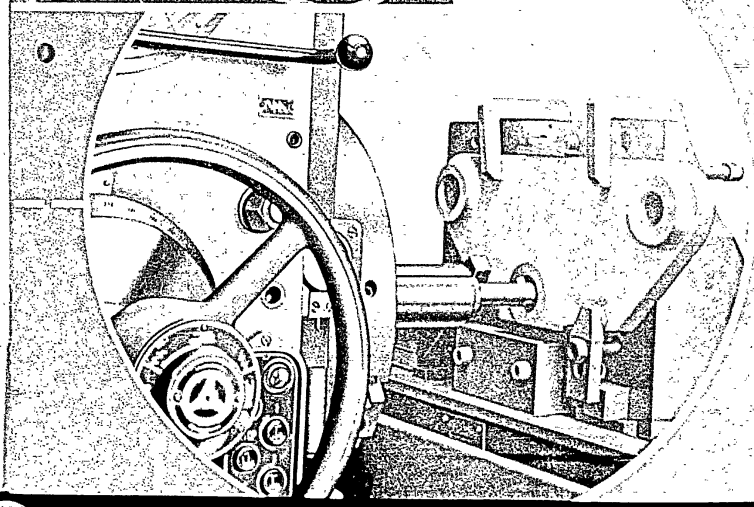


Cooling Attachment

The cooling attachment is supplied as optional equipment and is necessary for the machining of steel and cast steel, and consists of an electric pump with piping. The coolant tank is provided inside the bed and is fitted with a filter.

Standard Equipment

Magnifying glass
Set of spanners
Grease gun
Operating plates
Operator's instruction booklet



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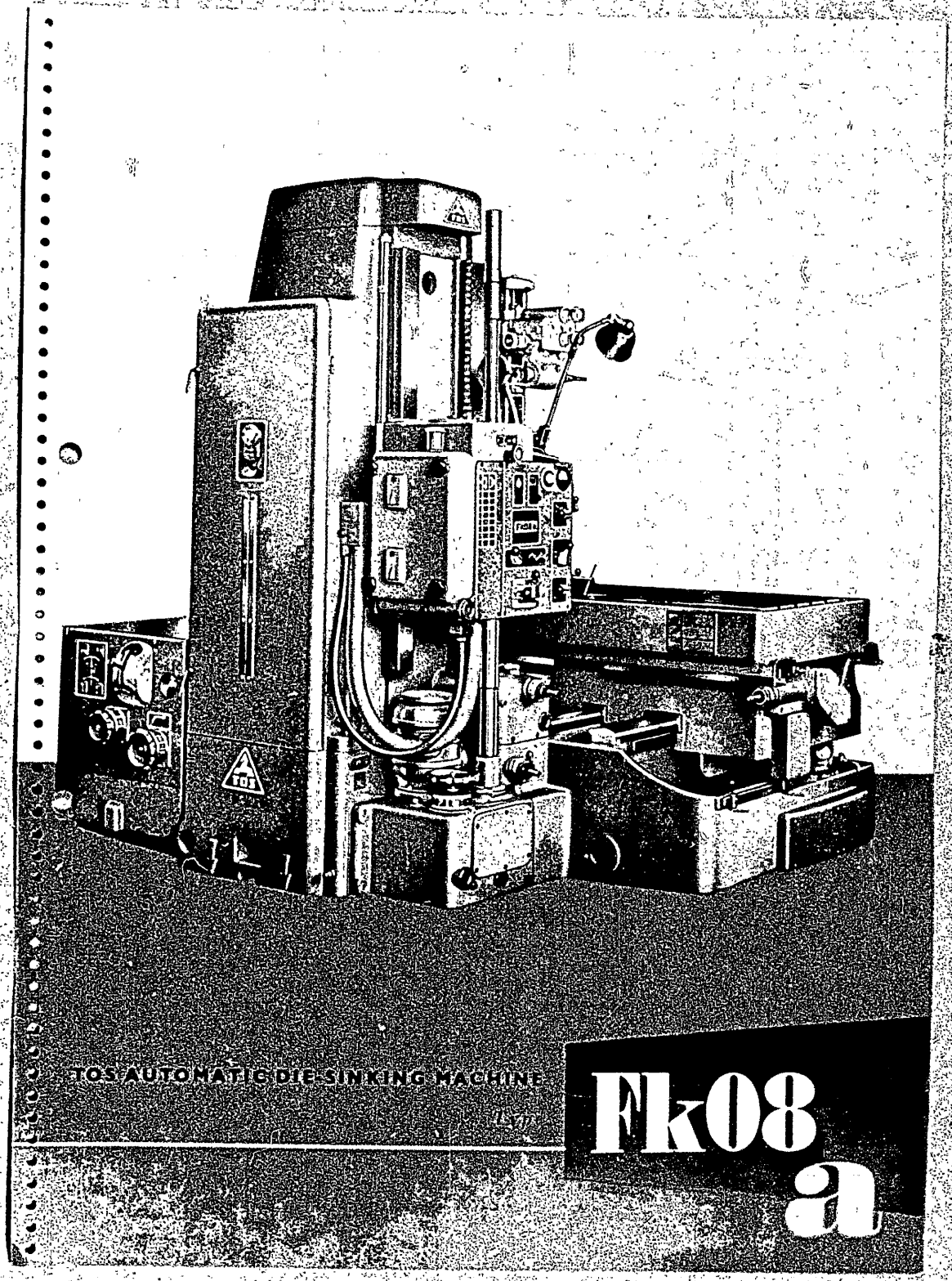

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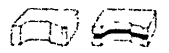
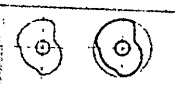
Working scope of the Fk 08 series of die-sinking machines

a

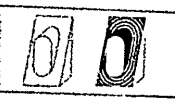
Operation controlled by hand.
Automatic operation - copying in coordinates:
Copying by strokes



Copying without automatic movement governing pitch of strokes

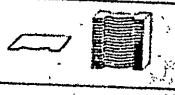


Contour copying (semi-automatic)



Contour and depth copying (semi-automatic)

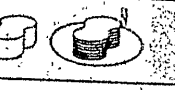
Copying of mirror image of master form



Copying with tracer carriage at rest

Automatic operation - circular copying:
Circular copying in a helix

Circular copying in a spiral



Circular contour copying by means of a finger-type tracer and vertical milling head

Circular contour copying by means of a finger-type tracer and horizontal milling spindle

Circular copying of a mirror image of master form

Circular copying with tracer carriage at rest

Circular copying by means of a cylindrical tracer and horizontal milling head (cylindrical cutter)

Circular copying in segments by means of special equipment

Automatic operation - copying by means of two-tracer attachment.

Special operation.

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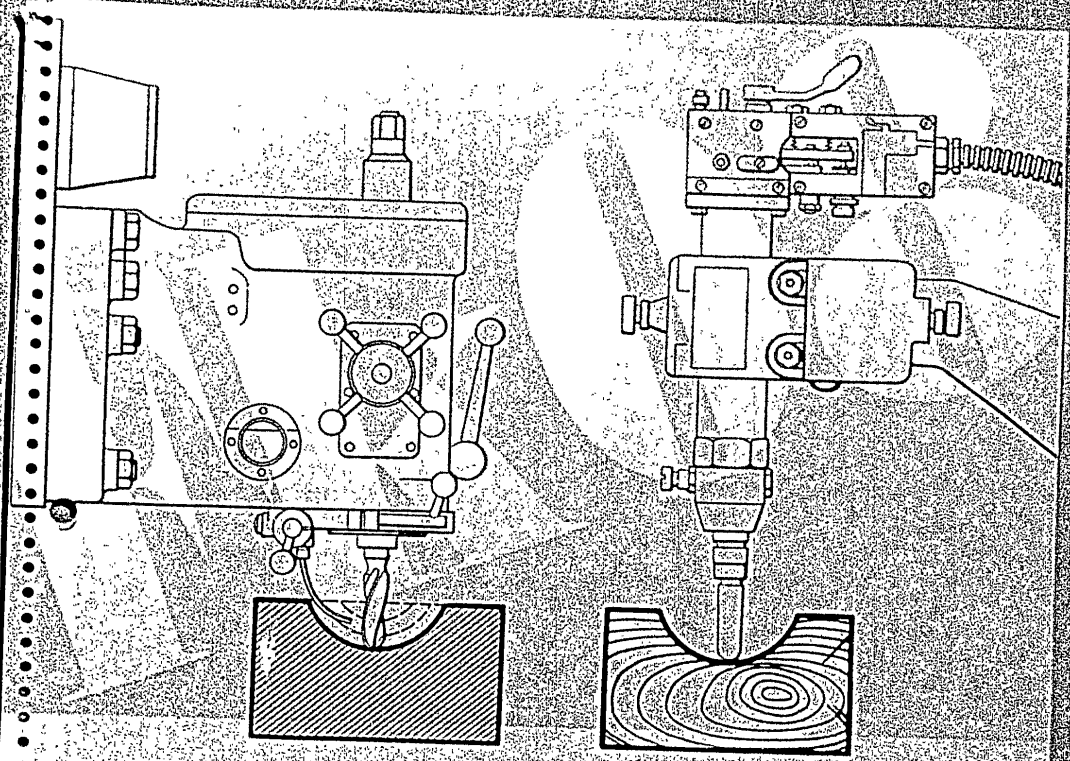

Fk 08 series of TOS automatic die-sinking machines

with electric tracer control for accurate and efficient milling of shapes in metal are produced in three types having roughly the following main characteristics:

Fk08 a — the basic machine for copying in coordinates by strokes as well as for contour copying of objects identical with the copied master form.

Fk08 b — a machine having the same working scope as the type Fk 08a on which, however, also shapes can be produced which are a mirror image of the master form.

Fk08 c — a machine having the same working scope as both above mentioned machines but having, in addition, two rotary tables for circular copying, one of which carries the master form, the other the machined object.

On all the machines either one larger object may be machined or, simultaneously by two tools, two smaller objects not wider than 250 mm. Details of the working scope of all three types of machines are given in the following table:

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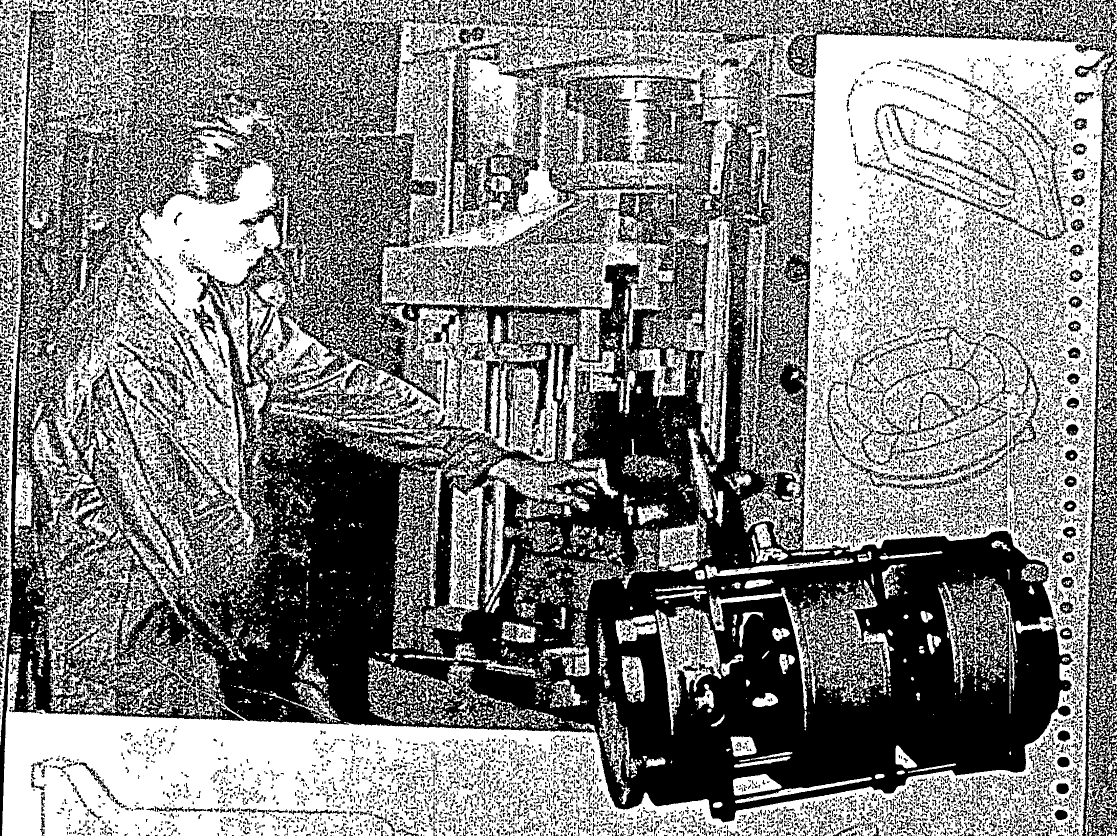

With the endeavour to achieve an increasing degree of efficiency in industrial production the manufacture of objects by moulding is assuming an increasing importance. Included among these manufacturing processes are drop forging, pressing from metal sheets, die casting, moulding of pulverized metal, moulding of plastics, rubber, glass, etc. The manufacture of the appropriate dies is becoming an important manufacturing branch placing heavy demands not only on the skill of the workmen but also on the perfection of the machines used for the purpose. The manufacture of dies frequently requires highly specialized machine tools. These machine tools include, among others, copying machines which, governed by the light contact between a tracer and a master form, cut complicated and irregular shapes in steel and other metals. Thus the machines replace tedious and costly manual work in the manufacture of dies, moulds, metal patterns, templates, cams, etc. and enable them to be manufactured automatically and accurately. At the same time finishing operations are reduced to a minimum and often eliminated altogether.

The difference between the basic groups of copying machines lies in the method by which firm and accurate guiding of the tool is obtained from a minute force acting upon the tracer. One of these methods uses electricity for the purpose. The tracer controls, by the closing of contacts or some other electro-magnetic change, the electric drive of the copying movements. The above mentioned method of control by electric tracers is also used on the Fk 08 Series of TOS Die - Sinking Machines. The control is of the TOS works' own, novel design. The working scope of the machine as well as a description and illustrations will be found on subsequent pages of this catalogue.

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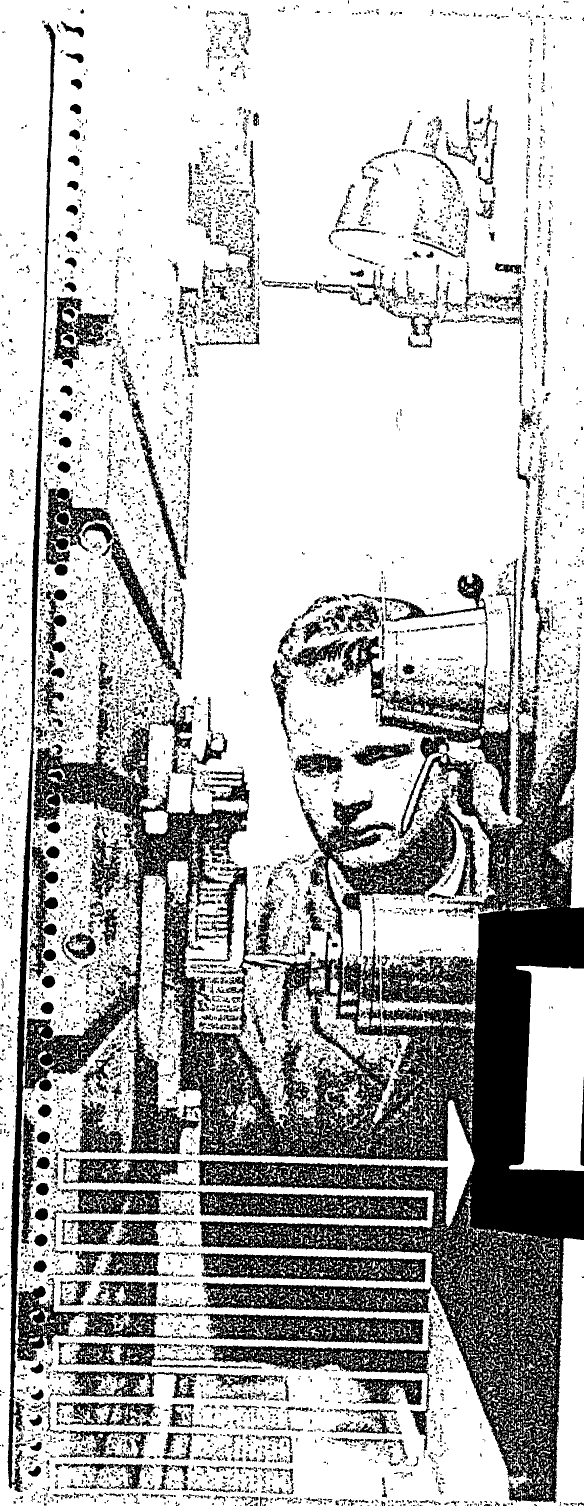

AUTOMATIC DIE-SINKING MACHINES

with Electric Tracer Control

Type

FK08

TOS

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SPECIFICATION OF POLAK 900-XVI MACHINE

Maximum permissible weight of casting	
for alloys of heavy metals	kg 1 — 5.8 lbs
for aluminium alloys	kg 1.8 — 4.0 lbs
Maximum permissible area of casting in parting line of die	
for alloys of heavy metals	cm² 200 — 31 sq. inches
for aluminium alloys	cm² 400 — 62 sq. inches
Average production rate per hour — depending on casting	shots 70 to 120
Maximum disclosing force	tons 115
Pressure applied to metal	tons 5.5 to 22 to 28
Maximum opening of machine	mm 1000 — 39½"
Minimum opening of machine (minimum height of die including clamping box)	mm 550 — 21½"
Consumption of pressure liquid per shot, approx.	litres 18 — 4.0 gals
Floor space required for machine, approx.	mm 2600 × 1700 — 103" × 67"
Maximum height above floor	mm 2150 — 85"
Maximum depth below floor	mm 805 — 31½"
Net weight of machine, approx.	kg 4300 — 9500 lbs
Gross weight of machine, railway packing, approx.	kg 4500 — 9900 lbs
Gross weight of machine, seaworthy packing, approx.	kg 4670 — 10300 lbs
Measurement of packing case	metres 3.2 × 1.8 × 1.9 — 10'6" × 5'11" × 6'3"

Type RP XX Pump

Output of pump	litres per min. 60 — 13 Gals per min.
Speed of pump	r. p. m. 540
Speed of motor	r. p. m. 1440
Output of motor	kW 16.5
Floor space required for pump with motor, approx.	mm 1200 × 2300 — 48" × 91"
Net weight, approx.	kg 760 — 1680 lbs
Gross weight, railway packing, approx.	kg 840 — 1850 lbs
Gross weight, seaworthy packing, approx.	kg 1000 — 2200 lbs
Measurement of packing case	metres 1.3 × 2.5 × 1.5 — 4'3" × 8'3" × 4'11"

250 Litre (55 Gal) Accumulator

Contents of bottles	litres 250 — 55 Gals
Working pressure	atm 120 — 1700 psi
Floor space required	mm 800 × 800 — 32" × 32"
Height above floor, approx.	mm 3800 — 150"
Net weight, approx.	kg 670 — 1480 lbs
Gross weight, railway packing, approx.	kg 780 — 1720 lbs
Gross weight, seaworthy packing, approx.	kg 920 — 2030 lbs
Measurements of packing case	metres 4 × 1 × 0.9 — 13'2" × 3'4" × 3'

We supply

Hydraulic core-pullers — hydraulic ejectors — working and melting furnaces, gas and oil fired — filling cylinders and gates of various diameters.

We manufacture dies for diecasting of metals

We prepare plans for pressure diecasting plants of all sizes

We offer our advice on all problems concerning this branch

Our products are continuously being improved upon. The description, illustrations and particulars can therefore not always accurately agree with the latest design of machine and consequently are not binding.

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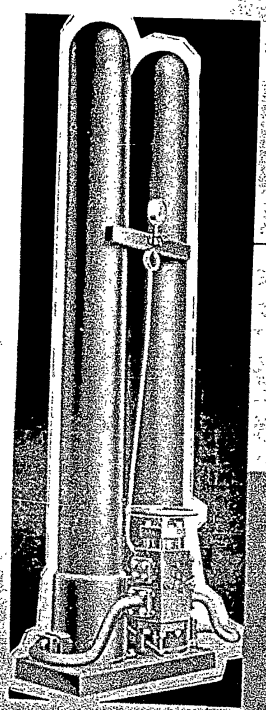
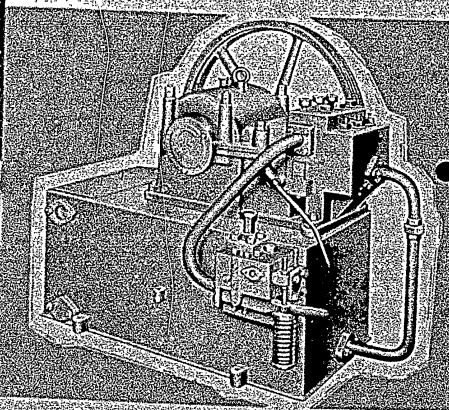


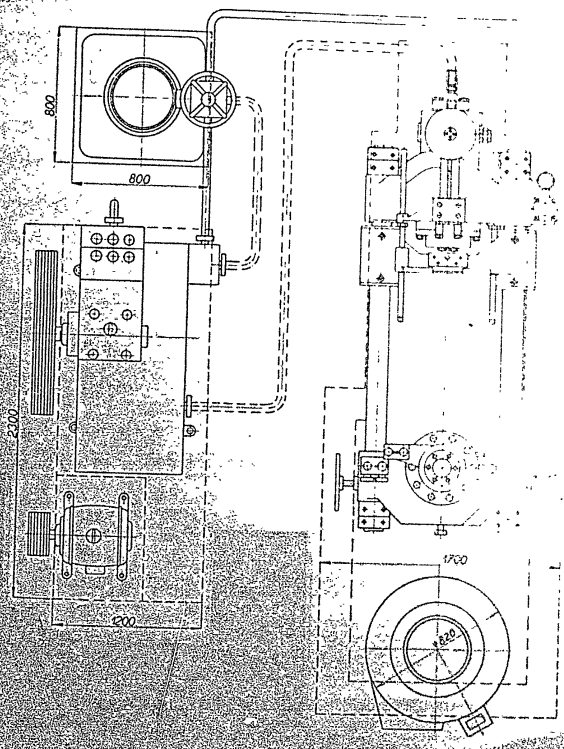
The accumulator

is a hydro-pneumatic unit with a capacity of 250 litres (55 gals). It ensures the immediate availability of the requisite quantity of pressure liquid and permits relatively high speeds and easy control of the closing and injection pistons to be achieved independently of the pump. The output of the pump and, as a result, the electric power consumption are very low.

The pump

is a high speed unit, with horizontal pistons, of simple design, absolutely reliable in operation. It is driven by an electric motor and stops and starts automatically in accordance with the permissible rise or drop of pressure in the accumulator.





The machine, pump and accumulator form the pressure die-casting equipment. Since each of these units forms an independent assembly, the machine alone can, for instance, be connected to an existing pressure system. When a fairly large number of machines is being installed a central pressure piping with a central pumping plant can be set up.

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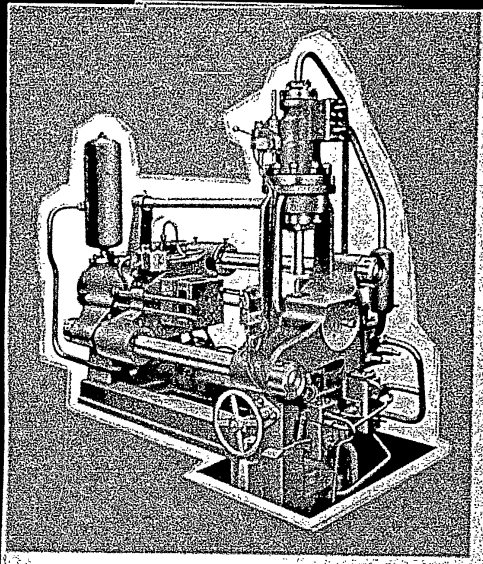


DESCRIPTION

The base plate

is made of cast iron and consists of the part carrying the closing cylinder and the part carrying the pressure stirrup. The two parts are bolted together. The part carrying the pressure stirrup extends below the floor and the lower hydraulic piston is fitted inside it.

The closing cylinder

is made of cast steel and is provided with two lugs for the attachment of the ends of two columns which join the closing cylinder to the pressure stirrup.

The closing piston

is made of steel. Its surface is carefully ground to reduce the wear of the sealing collars to a minimum. It consists of two parts, the inner small feeding piston and the main closing piston. The feeding piston closes the machine with a small force, the main piston drawing in discharge liquid (without pressure) from a tank arranged above the closing cylinder. The liquid is drawn in through a check valve. As soon as the two halves of the die come into contact the check valve closes and the pressure in the closing cylinder rises to the working pressure of 120 atm. (1700 psi). The machine is closed by the mean force.

The intensifier

raises the pressure in the closing cylinder and thus develops the full closing force of the machine.

The pressure cylinder

is fitted to the pressure stirrup of the machine and is made of cast steel. It is provided with a pressing force reducer and de-aerating valves.

The pressure plunger

is made of steel and carefully ground. To the pressure plunger the injection piston is fitted in a simple manner by means of an extension. This piston is easy to replace.
The pressure stirrup is made of cast steel and, like the closing cylinder, provided with two lugs for the attachment of the columns to the stirrup.

The cold pressure chamber

is fitted which consists of the filling box containing the cylinder and the gate. The filling box is provided with channels for water cooling. The cylinder and gate are made of special alloy steel to withstand the high thermal and mechanical stresses.

The two horizontal columns

join the closing cylinder to the pressure stirrup. They transmit the full closing force and also serve as a guide for the die carrier. They are placed transversally above each other so that the die is accessible from all four sides.

The die carrier

is made of cast steel and provided with two exchangeable bushes of generous dimensions by means of which it is guided on the columns.

The hand distributor

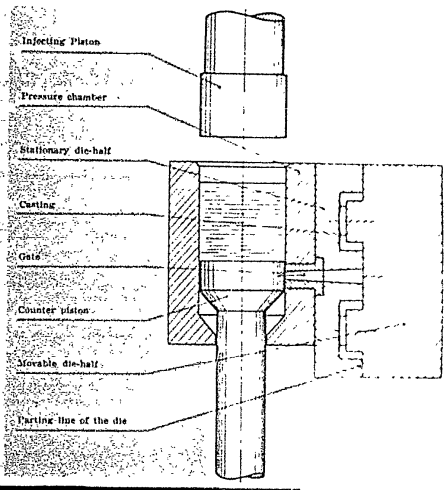
fitted to the pressure stirrup at a convenient height, controls the various movements of the machine, i.e. closing, injection and opening.

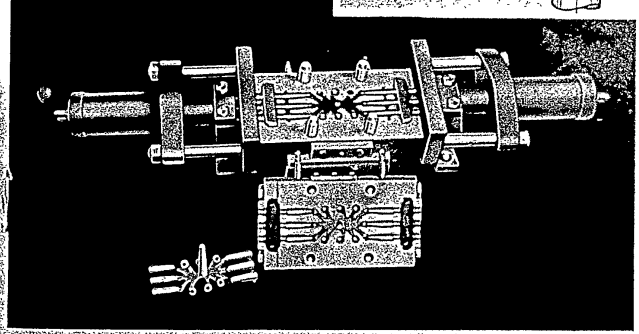
The fixed half of the die

is attached to the pressure stirrup. It is provided on its seating surface with a recess for the head of the gate.

The moving half of the die

is attached to the die carrier by means of the clamping box.





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POLAK 900-XVI

POLAK 900-XVI Pressure Diecasting Machine with cold pressure chamber

Modern production

demands reliable, simple and safe machines with the highest possible rate of production and simple and easy control.

Hydraulic machines

satisfy these demands and, at the same time, permit high pressures and heavy forces to be developed with perfect safety with comparatively small dimensions of machines.

Pressure diecasting machines

of our manufacture are fully hydraulic and operate with a pressure of the operating liquid of 120 atm (1700 psi). The relatively high speeds of the various movements and ease of control of these speeds make the machines easily adaptable to operating conditions and result in a high output.

Pressure diecasting of metals — a direct transformation of material into the finished product

Pressure diecastings have a smooth surface and accurate dimensions and castings from the same die are practically absolutely identical and satisfy the requirement of interchangeability. They require only little machining or none at all and in many cases can be fitted immediately. They have good mechanical properties. Considerable savings in weight are obtained by them due to their relatively thin walls.

The use of re-melted alloys

and possibility of utilizing even scrap such as sprues, material remaining in the pressure chamber, rejects, etc. without, in the majority of cases, affecting the quality of the castings makes pressure diecasting one of the most economical manufacturing processes.

OUTSTANDING FEATURES

- High output of castings of all kinds of various alloys suitable for diecasting.
- Simple operation and easy access to all important parts and to the hydraulic line.
- Ease of control. An infinitely variable control of the closing and injection piston speeds within a wide range and a control by steps of the pressing force make the machine highly adaptable to the operating conditions most suitable for the various alloys.
- Quick and easy exchange of dies due to the fact that the hydraulic closing of the die permits the fitting of dies of various heights without any adjustment of the closing parts of the machine.
- Cold pressure chamber. The pressure chamber is separate from the die. The metal can be cast at the lowest possible temperature. This considerably increases the life of the die. The vertical arrangement of the pressure chamber eliminates every possibility of air being enclosed in the chamber and forced into the cavity of the die.
- High specific pressure upon the metal. The castings have a smooth surface and a fine structure which gives them the best mechanical properties.
- Cheap and safe operation. There is no fire hazard because the pressure liquid is an emulsion of water and oil.

Applications of the POLAK 900-XVI Pressure Diecasting Machine

A few industries in which diecasting has been adopted on a large scale are listed below.

Automotive industry

various decorative mouldings, carburetor bodies, central lubrication pump bodies, oil filter bodies, motorcycle cylinder heads, etc.

Electrical engineering industry

power as well as communications — various covers and frames of measuring instruments, switch boxes, rotors, stators, end shields and fans of electric motors, etc.

Optical industry

camera frames, telescope parts, parts such as stands of various optical instruments, etc.

Fittings industry

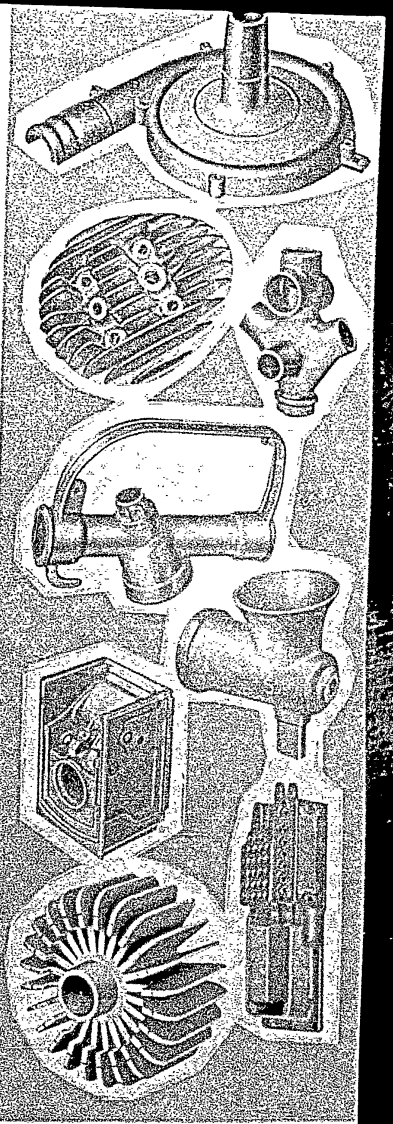
water taps, sets of bathroom fittings, parts of special shapes, water meter parts, hose connections, etc.

Household appliance industry

meat mincers, coffee grinders, fruit presses, vacuum cleaner parts, table fans, etc.

The POLAK 900-XVI Pressure Diecasting Machine

is fully automatic and suitable for the production of castings of aluminium, magnesium and zinc alloys and of brass.



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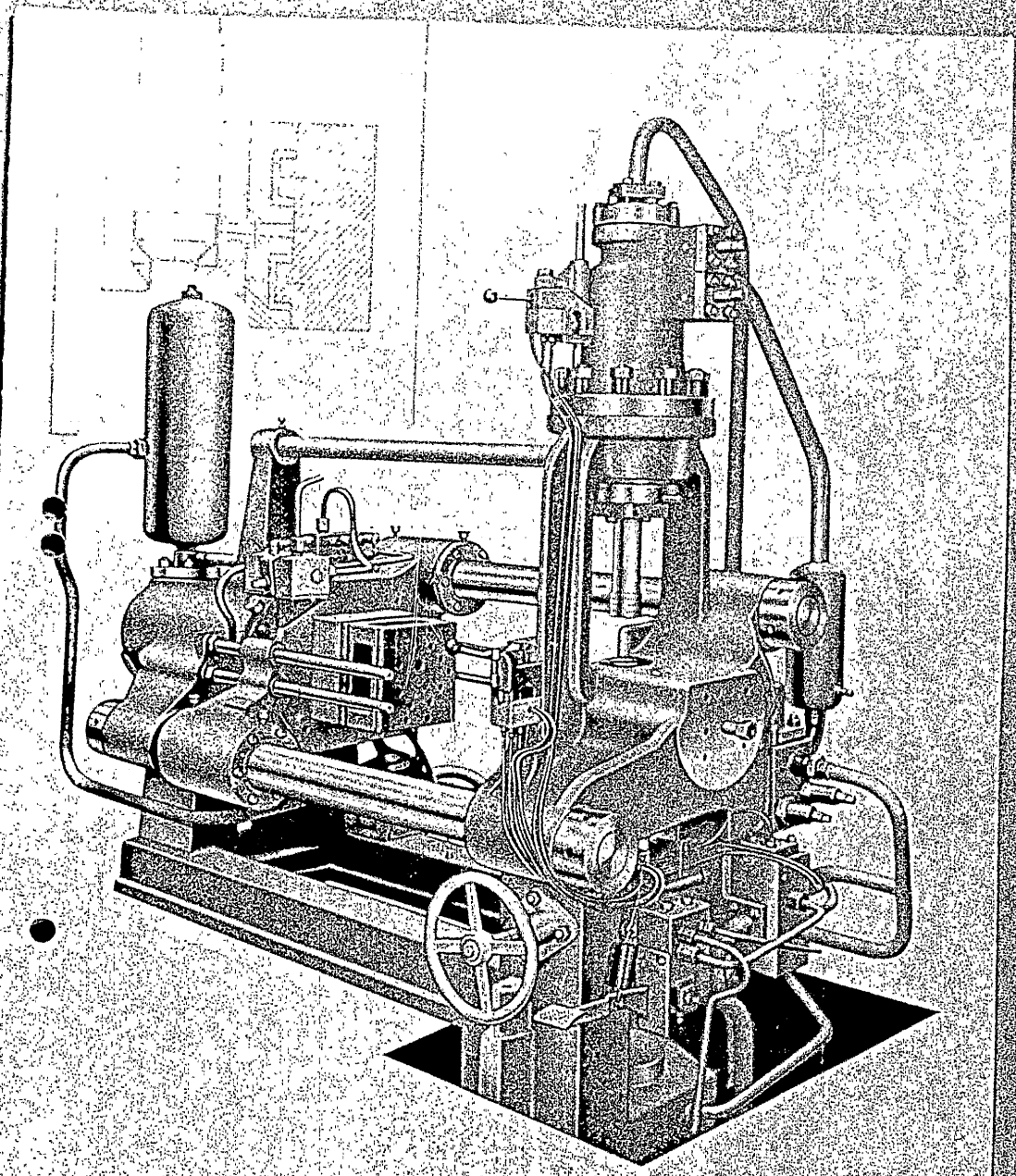

PRESSURE DIECASTING MACHINE

POLAR 900-XVI

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SPECIFICATION

Maximum permissible weight of casting	
for alloys of heavy metals	kg 15 — 33 lbs
for aluminium alloys	kg 8 — 18 lbs
Maximum permissible area of casting in parting line of die	
for alloys of heavy metals	cm² 400 — 62 sq. inches
for aluminium alloys	cm² 900 — 140 sq. inches
Average production rate in 8 hours	shots 400 to 600
Maximum die closing force	tons 220
Pressure applied to metal	tons 10 to 55
Maximum opening of machine without spacer block	mm 1200 — 47"
Minimum opening of machine without spacer block	mm 600 — 23½"
Maximum opening of machine with spacer block	mm 1000 — 39½"
Minimum opening of machine with spacer block	mm 400 — 16"
Consumption of pressure liquid per shot, approx	litres 40 — 9 Gals
Floor space required for machine, approx.	mm 4200×1900 — 165"×75"
Maximum height above floor	mm 3700 — 145"
Net weight of machine, approx.	kg 10500 — 23700 lbs
Gross weight of machine, railway packing, approx.	kg 10750 — 23700 lbs
Gross weight of machine, seaworthy packing, approx.	kg 12000 — 26500 lbs
Measurements of packing case — 3 cases	metres 4.7×1.5×1.3 — 12'3"×5'3"×4'3"
	0.3×1.5×1.8 — 1'×4'11"×5'11"
	2.5×1.0×0.9 — 8'2"×3'3"×2'11"

Type RP XX Pump

Output of pump	litres per min. 60 — 13 Gals per min.
Speed of pump	r. p. m. 340
Speed of motor	r. p. m. 1440
Output of motor	kW 16.5
Floor space required for pump with motor, approx.	mm 1200×2300 — 48"×91"
Net weight, approx.	kg 760 — 1680 lbs
Gross weight, railway packing, approx.	kg 840 — 1850 lbs
Gross weight, seaworthy packing, approx.	kg 1000 — 2200 lbs
Measurement of packing case	metres 3.3×2.6×1.5 — 13'×8'7"×4'11"

500 Litre (110 Gals) Accumulator — Two-Bottle

Contents of bottle	litres 500 — 110 Gals
Working pressure	atm 120 — 1700 psi
Floor space required	mm 1700×1000 — 67"×39"
Height above floor, approx.	mm 3800 — 150"
Net weight, approx.	kg 1250 — 2700 lbs
Gross weight, railway packing, approx.	kg 1400 — 3080 lbs
Gross weight, seaworthy packing, approx.	kg 1700 — 3750 lbs
Measurement of packing case	metres 3.9×1.8×1.1 — 12'10"×5'11"×3'7"

We supply

Hydraulic core-pullers — hydraulic ejectors — working and melting furnaces, gas or oil-fired — filling cylinders and gates of various diameters.

We manufacture dies for diecasting of metals

We prepare plans for pressure diecasting plants of all sizes

We offer our advice on all problems concerning this branch

Our products are continuously being improved upon. The description, illustrations and particulars can therefore not always accurately agree with the latest design of machine and consequently are not binding.

STROJEXPORT PRAHA CZECHOSLOVAKIA

BATLIBOI & CO.
MACHINE TOOLS DEPT
BOMBAY

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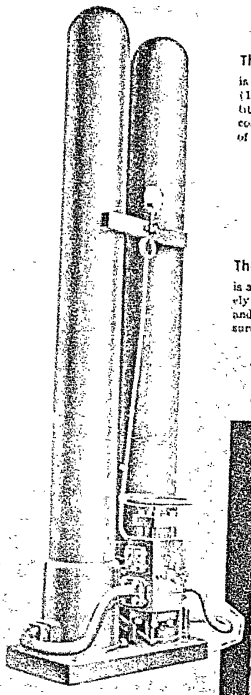
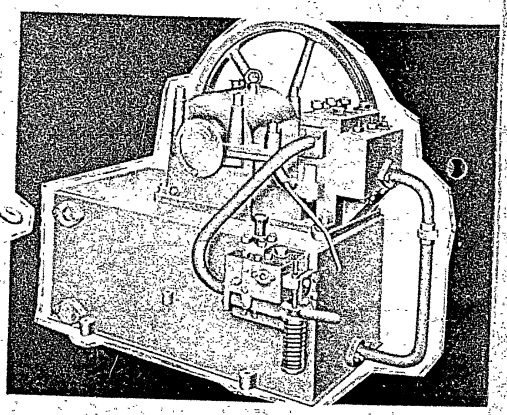


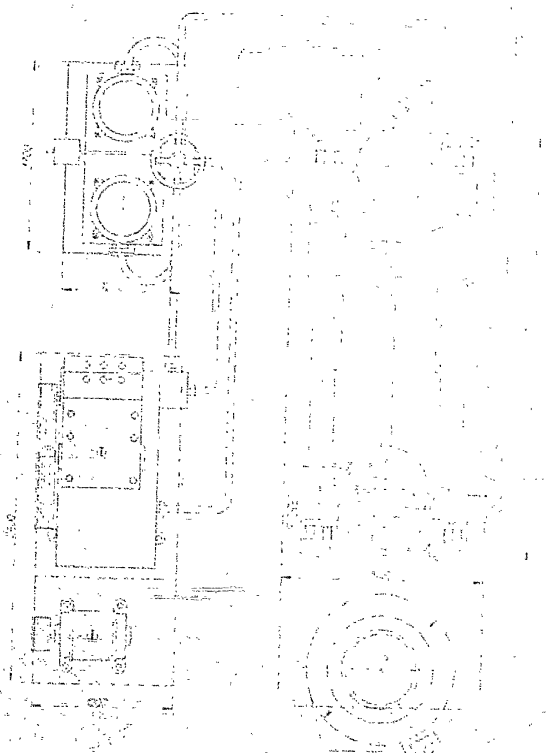
The accumulator

is a two-bottle hydro-pneumatic unit with a total capacity of 500 litres (110 gals). It ensures the immediate availability of the requisite quantity of pressure liquid and permits relatively high speeds and easy control of the closing and injection pistons to be achieved independent of the pump.

The pump

is a high speed unit with horizontal pistons, of simple design, absolutely reliable in operation. It is driven by an electric motor and stops and starts automatically in accordance with the rise and drop of pressure in the accumulator within permissible limits.





The machine, pump and accumulator form the pressure diecasting equipment. Since each of these units forms and independent assembly the machine alone can, for instance, be connected to an existing pressure system. When a fairly large number of machines is being installed a central pressure piping with a central pumping plant can be set up.

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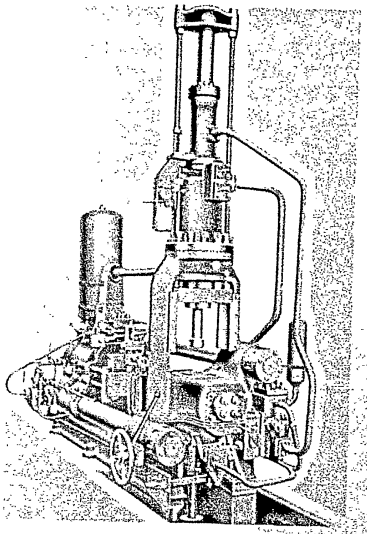


DESCRIPTION

The base plate

is made of cast iron and consists of two main parts joined together. One part carries the closing cylinder, the other part extends below the floor and carries the pressure stirrup.

The closing cylinder

made of cast steel is of generous dimensions. It is provided with two lugs for the attachment of the ends of two columns which join the closing cylinder to the pressure stirrup.

The closing piston

is made of high grade steel. Its surface is ground to reduce the wear of the sealing collars to a minimum. It consists of the inner small feeding piston and the main closing piston. The feeding piston closes the machine with a small force, the main piston drawing-in discharge liquid (without pressure) from a tank arranged above the closing cylinder. The liquid is drawn in through a check valve which is controlled. As soon as the two halves of the die come into contact the check valve closes and the pressure in the closing cylinder rises to the working pressure of 120 atm (1700 psi). The machine is closed by the mean force.

The intensifier

raises the pressure of the liquid in the closing cylinder and thus develops the full closing force of the machine of 220 tons.

The pressure cylinder

is fitted to the pressure stirrup of the machine and is made of cast steel. It consists of two parts. The lower part, in which the pressure plunger moves, is provided with a pressing force reducer and de-aerating valves, the upper part forms the so called return-cylinder in which a piston moves which returns the injection piston to its original position.

The pressure plunger

and return plunger are made of high grade steel and carefully ground. To the pressure plunger the injection piston is fitted in a simple manner by means of an extension. This piston is easy to replace.

The pressure stirrup

is made of cast steel and, like the closing cylinder, provided with two lugs for the attachment of the columns. In the stirrup

the cold pressure chamber

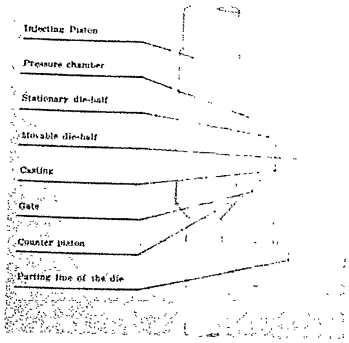
is fitted. The chamber consists of the filling box containing the cylinder and the gate. The filling box is provided with channels for water cooling. The cylinder and gate are made of special alloy steel to withstand the high thermal and mechanical stresses.

The two horizontal columns

join the closing cylinder to the pressure stirrup. They transmit the full closing force and also serve as a guide for the die carrier. They are placed transversally above each other so that the die is easily accessible from all four sides.

The die carrier

is made of cast steel. In case of high dies it is bolted directly to the closing piston. In case of normal dies a spacer block is fitted between the closing piston and the die carrier. The carrier is provided with two exchangeable bushes of generous dimensions by means of which it is guided on the columns.



The hand distributor

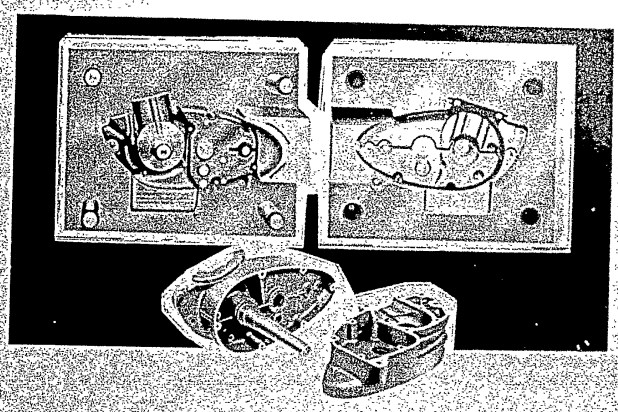
fitted to the pressure stirrup at a convenient height controls the various movements of the machine, i. e. closing, injection and opening. It has a single lever which is easy to operate.

The stationary half

of the die is attached to the pressure stirrup. It is provided on its seating surface with a recess for the head of the gate.

The movable half of the die

is attached to the die carrier by means of the clamping box.



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POLÁK 2255
PRESSURE DIECASTING MACHINE WITH COLD PRESSURE CHAMBER

Pressure diecastings
are characterized by a fine structure, smooth surface, good mechanical properties and accurate dimensions.

In many cases
re-melted alloys are used for the manufacture of these castings. Scrap such as sprues, material remaining in the pressure chamber and rejects can be used again. When changing over from some other manufacturing process to pressure diecasting it may be possible to replace the material used in the past by cheaper material without in any way affecting the quality of the castings.

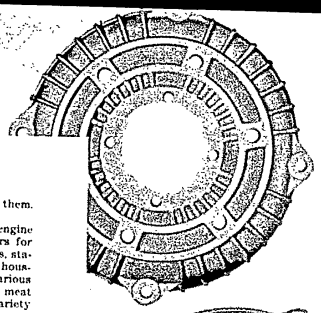
The high degree of economy
of all methods of shaping material without the use of cutting tools and abrasives is now-a-days being fully appreciated.

Pressure diecasting
of metals is the most favourable method from the point of view of economy. It enables the material to be transformed directly into the finished product and thus reduces losses of material and machining costs.

Interchangeability of parts
which is the fundamental condition of quantity production is satisfied as castings from the same die have practically identical dimensions.

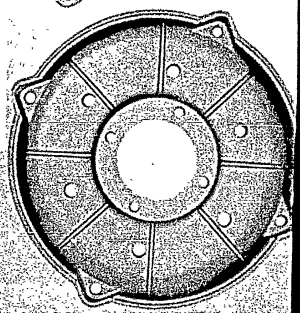
OUTSTANDING FEATURES

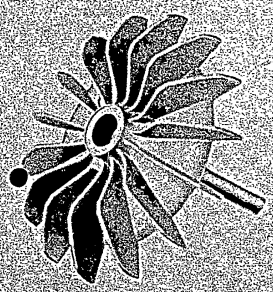
- **High output**
- **Cold pressure chamber**
  Aluminium alloys, very sensitive to being spoiled by admixtures of iron, can be cast without risk.
- **Hydraulic closing of die**
  permits dies of various heights to be fitted without any adjustment of the closing parts of the machine.
- **Wide opening of machine**
  and long stroke of closing piston. Exceptionally high dies can be fitted, such as those used, for instance, for the casting of rotors of electric motors, etc.
- **Exchangeable spacer block**
  between closing cylinder and die carrier. It is used for normal dies to eliminate dead movement of the piston and has to be removed for high dies.
- **Simple operation**
  and easy access to all important parts and to the hydraulic line.
- **Simple and reliable control of machine**
- **The pressure liquid**
  is an emulsion of water and oil. Safe operation — no fire hazard.

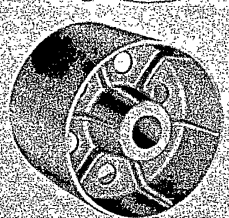


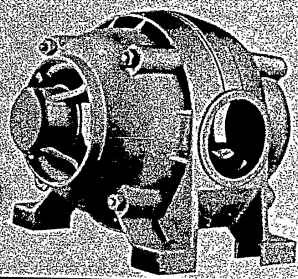
Applications of the POLÁK 2255 Pressure Diecasting Machine
cover a very wide range and it is impossible to list all of them. A few examples are mentioned below.
Cylinder heads of motor cycle engines — motor cycle engine crankcase covers — rotors of blowers and air compressors for internal combustions engines — carburetor bodies — rotors, stators and end shields of electric motors — electric hand drill housings — sewing machine bodies — typewriter frames — various frames for measuring instruments — table fan parts — meat mincers and parts of various household appliances and a variety of other castings of a technical nature.

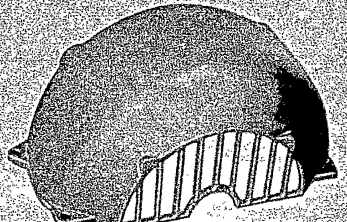
The POLÁK 2255 Pressure Diecasting Machine
is a hydraulic machine suitable for the production of castings of heavy metals up to a weight of 15 kg (33 lbs) including the gate and up to an area in the parting line of the die of 400 cm² (62 sq. inches) or of castings of aluminium alloys up to a weight of 8 kg (18 lbs) including the gate and up to an area in the parting line of 900 cm² (140 sq. inches).











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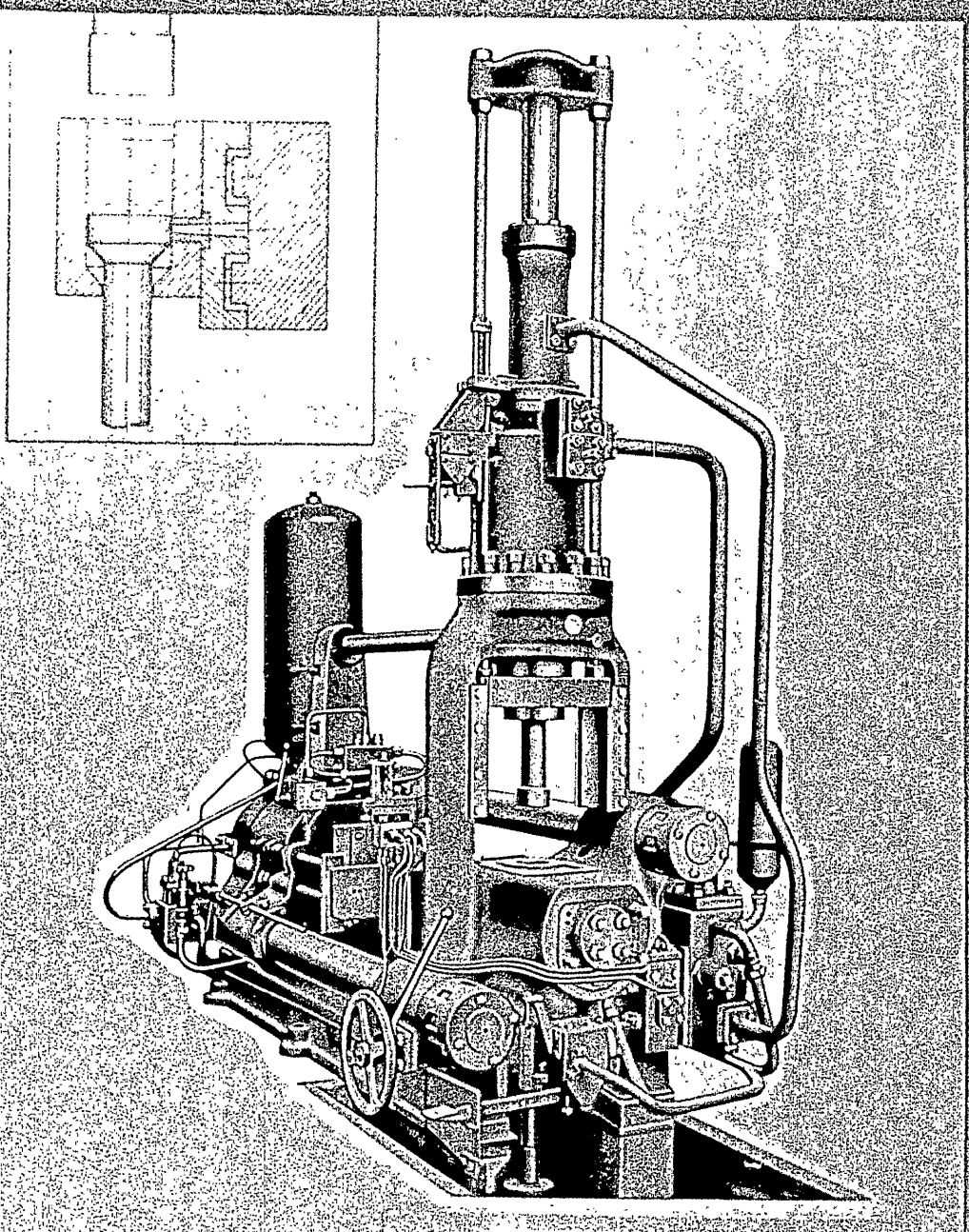

PRESSURE DIECASTING MACHINE

POLAR 2255

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SPECIFICATIONS

Maximum weight of the casting of Zn and Cu alloys	kgs	0,4	oz	14
Maximum weight of the casting of light metal alloys	kgs	0,2	oz	7
Maximum area of castings in the parting line of the die:				
for copper and zinc alloys	cm²	60	sq. in	9.6
for light metal alloys	cm²	80	sq. in	12.5
Average production rate in 8 hours	shots	1200—1400	shots	1200—1400

Closing Capacity

Working pressure	kg/cm²	120	lbs/sq. in	1706
Pressure of closing piston (up stroke)	kg	2300	lbs.	5000
Die-closing pressure	kg	39600	lbs.	87000
Die-closing pressure (down stroke)	kg	4500	lbs.	9900
Stroke of closing piston	mm	250		9.8"
Opening of machine — Parting-Line-System max.	mm	525		20.6"
min.	mm	275		10.8"
Opening of machine — Center-Gate-System max.	mm	417		16.3"
min.	mm	167		6.6"

Pressing Capacity

Working pressure	kg/cm²	120	lbs/sq. in	1706
Adjustable pressure applied to metal	kg	8500	lbs.	18700
Pressure of pressing piston, down stroke	kg	1900	lbs.	4200
Gate cutting pressure	kg	3000	lbs.	6600
Pressure of counter piston, down stroke	kg	1000	lbs.	2200
Stroke of pressing piston	mm	140		5.5"
Stroke of counter piston	mm	90		3.51"
Pipe for pressure water	Ø mm	38/27		1.49"/1.06"
Pipe for discharge water	G	1¼"		1¼"
Consumption of pressure water, including core pullers, per shot	approx. litres	4	galls	0.88

Die Casting Machine

Floor space required	mm	1150 × 450	in.	37 × 18
Height of machine	mm	1800	in.	71
Net weight of machine with standard accessories	approx. kg	1250	lbs.	2750
Gross weight of machine packed for rail	approx. kg	1440	lbs.	3110
Gross weight of machine packed for overseas	approx. kg	1550	lbs.	3400
Contents boxed	m³	4	cu. ft.	141

Driving Plant RP 9-23

Capacity	litres/min	27	gals/min	6
Total contents of accumulator	litres	40	gals	9
Floor space required for driving plant	mm	1800 × 900	ft.	3 × 6
Net weight	kg	800	lbs.	1750
Gross weight packed for rail	kg	900	lbs.	2000
Gross weight packed for overseas	kg	1000	lbs.	2200
Contents boxed	m³	4	cu. ft.	141

Working Furnace (gas or oil fired)

Crucible contents for heavy metals	kg	50 or 100	lbs	110 or 220
Diameter of furnace	mm	700 or 822		2'4" or 2'10"
Height of furnace	mm	700		2'4"
Weight of crucible for heavy metals	kg	23 or 45	lbs	51 or 99
Net weight of furnace	kg	350 or 580		770 or 1276 lbs.
Gross weight packed for rail	kg	400 or 660		900 or 1453 lbs.
Gross weight packed for overseas	kg	450 or 720		1000 or 1584 lbs.
Contents boxed	m³	0,65 or 1,1	cu. ft.	23 or 39

Pressure Diameter inch.	Chambers Volume cu. inch.	Specific pressure inside the pressure chamber lbs/sq. inch.	Maximum area of the casting incl. the gate sq. inch.	Weight of the alloy in the pressure chamber lbs			Weight of the casting lbs		
				= 2,4 Al	= 6,2 Zn	= 7,3 Cu	= 2,4 Al	= 6,2 Zn	= 7,3 Cu
1 37/64	4.2717	9670.75	8.525	—	0.94	1.12	—	0.66	0.77
1 39/64	5.1870	7538.6	10.850	—	1.16	1.37	—	0.79	0.94
1 41/64	6.4075	6116.0	13.950	0.55	1.43	—	0.375	0.99	—

When ordering, specify voltage, phase and frequency of power supply.

As improvements are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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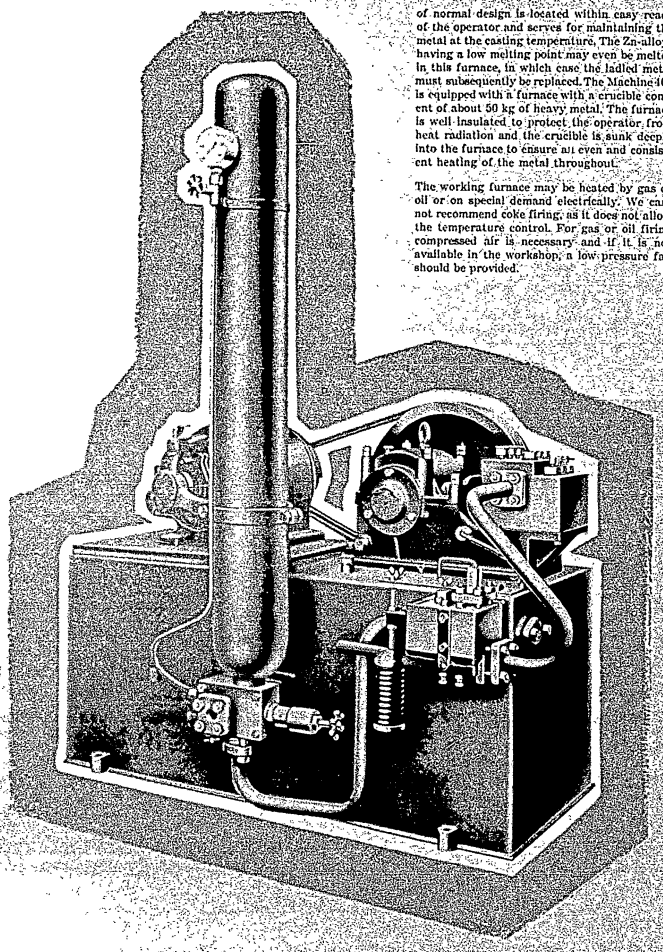
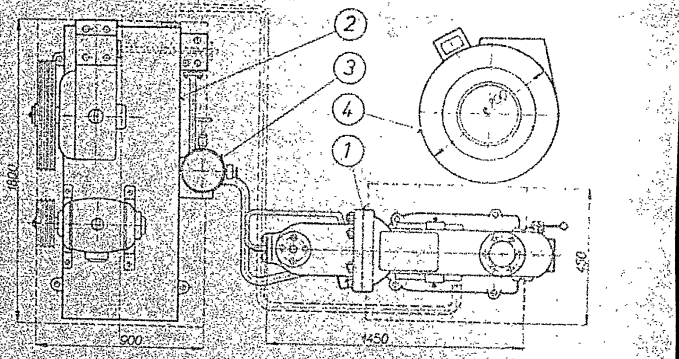


The Working Furnace

of normal design is located within easy reach of the operator and serves for maintaining the metal at the casting temperature. The Zn-alloys having a low melting point may even be melted in this furnace, in which case the ladled metal must subsequently be replaced. The Machine 408 is equipped with a furnace with a crucible content of about 50 kg of heavy metal. The furnace is well insulated to protect the operator from heat radiation and the crucible is sunk deeply into the furnace to ensure an even and consistent heating of the metal throughout.

The working furnace may be heated by gas or oil or on special demand electrically. We cannot recommend coke firing, as it does not allow the temperature control. For gas or oil firing compressed air is necessary and if it is not available in the workshop, a low pressure fan should be provided.



The Crucibles

for the furnace are supplied to suit the metal to be melted. For copper-base alloys the crucibles are made of special fire resistant steel, for Zn-alloys crucibles of cast iron or cast steel are employed.

The Working Furnace for Mg-alloys is of special design to prevent the access of air to the molten metal by using sulphur dioxide and thus enabling also this alloy to be worked on a pressure diecasting machine.

The Melting Furnace

is usually a crucible furnace of the tipping type, suitable for melting and deoxidizing the metal. One or several working furnaces can be charged with molten and pure metal from one melting furnace.

The Location

of the machine (1) is done according to the general layout plan or adapted to the local job requirement, with the exception of the working furnace (4) which must always be placed in strict accordance with the general layout plan, so as to enable the operator to ladle easily the metal. Nor should the accumulator (3) be located too far from the machine to avoid the undesirable severe pressure shocks due to an excessively high water column. If several machines are located in one shop it is advisable to arrange a central pressure plant of a capacity high enough to supply all machines with pressure water. In such a case it is possible to employ one accumulator for two machines. All accumulators are arranged in a circle and interconnected for achieving a better compensation of pressure and a uniform loading of the pressure pump. It is recommended to locate the pressure pumps (2) in a separate room to protect them from dust. The best way of controlling the functions of the pumps is to provide them with a change-over mechanism enabling a certain number of pumps to be continually in action while the other pumps serve only for compensating the pressure at peak output. The piping for the pressure water is supplied separately after the layout plan is definitely fixed.

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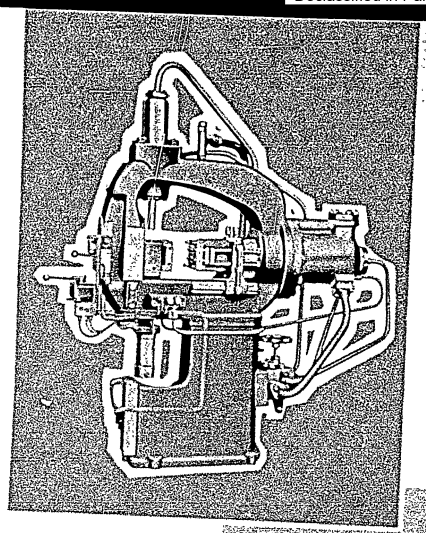


The Drawing of Cores

from the finished casting can be done either by the machine itself, if the cores are parallel to the axis of the machine, or by a hydraulic core puller, if they are across the direction of the machine axis. The core pullers are built as standardised units with the necessary drawing power and suitable stroke and are supplied with the machine as standard or optional equipment just as spare pressure chambers and other spare parts specified in our price quotation.

The ejection of the finished castings is accomplished by ejector pins which — according to the kind of castings and the construction of the die — are operated either automatically by stops in opening the die or by means of a hand lever, rack and pinion.

The Automatic Control of Pressure

is effected by a minimum pressure valve in the accumulator and by an automatic pressure valve on the pressure pump. As soon as the working pressure exceeds 120 atm. (1.700 lbs/sq in.) the automatic check valve opens and the pump runs idle. When the pressure drops the automatic check valve causes the pump to charge water again. In addition, a safety valve is provided which does not allow the pressure to exceed the permissible maximum while the minimum pressure valve prevents the pressure from dropping under the permissible limit

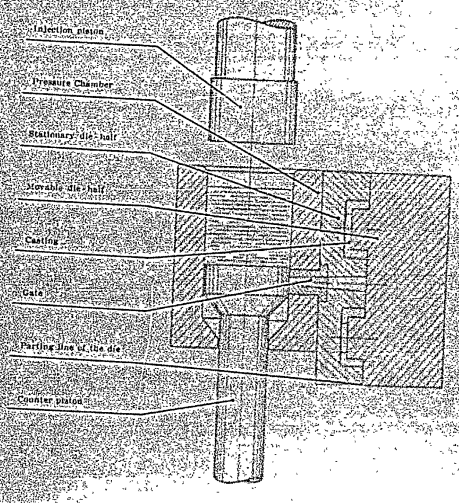
The Accumulator

consists of a seamless rolled pressure tube of steel, known as a "bottle", with a content of 40 litres (9 gals) and of a stop valve combined with the minimum valve. The pressure bottle is filled half with pressure water and half with compressed air or Nitrogen, and is designed to permit sudden discharge of water necessary for each operation of the machine, as well as the storage of pressure water supplied by the pressure pump between the individual working cycles. Due to this balancing effect of the accumulator the output of the pressure pump should not be higher than the average water consumption of the machine plus a reserve. Each bottle has to pass a rigid government inspection and is tested for a pressure higher by about 50% than is the actual working pressure. The test chart is sent to the customer with the machine.

The Pressure Diecasting Machine

can work either by the centre gate system, where the pressure chamber is arranged laterally to the die (Fig. 3) or by the direct injection method (parting line system) where the pressure chamber is in the parting line of the die (Fig. 2)

The centre gate system is used when working up Zn-, Al- and Mg-alloys which are usually cast in a liquid state. Due to their higher melting point the copper base alloys must be worked up at the lowest possible temperature in order to obtain the metal free from dir when it enters the die and also to save those parts of the die which come into contact with the metal. During the feeding process the small amount of metal cast on the type 408 having no great heating capacity is subject to considerable loss of heat. Therefore when casting Cu-alloys it is useful to bring the metal from the pressure chamber directly into the die as it is done at the parting line system. With this method the pressure chamber opens simultaneously with the die and is well cooled down by an air current while with the centre gate system the temperature of the pressure chamber, the counter piston and the sprue nozzle (with Cu-alloys) would be too high due to the high working speed of the machine.



The Hydraulic Pressure Plant ARP VIII

shown in Fig. 6 supplies the machine with the necessary pressure water under a pressure of 120 atm. (1700 lbs/sq. in.) It consists of a pressure pump with an automatic check valve, of an accumulator with a minimum pressure valve and of a driving motor. All these parts are mounted on the amply dimensioned tank.

The Pressure Pump RP 9-23

is built as a high speed three piston pump with a capacity of 27 litres (6 gals) per minute. The main shaft and the connecting rod of the pump rotate in anti-friction bearings which are housed in an oiltight crank box and run in an oil bath so that a minimum of attendance is required. The drive is by V-belts from a standard squirrel-cage induction motor with an output of 10 HP and a speed of 1440 r. p. m.

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PRESSURE DIECASTING MACHINE TYPE 408

is suitable for working up all kinds of non-ferrous metals such as: Zinc, Aluminium, Magnesium, and Copper base Alloys. The machine works both by the centre-gate and parting-line system and has the following characteristic features and advantages:

Ingenious and sturdy construction

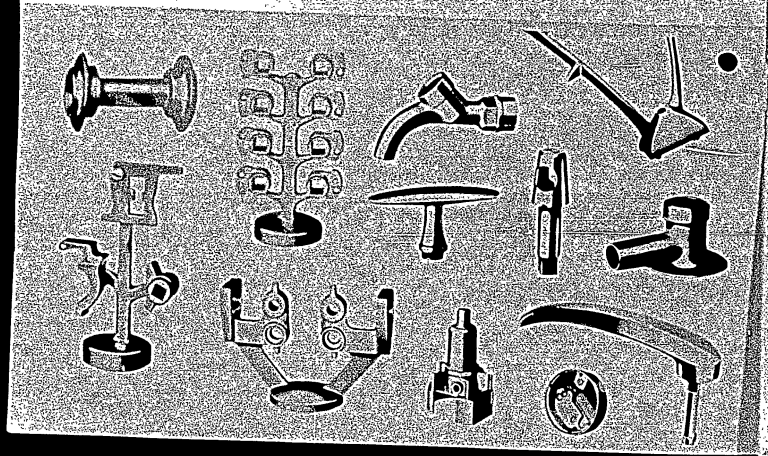
Ease of operation by a single handlever

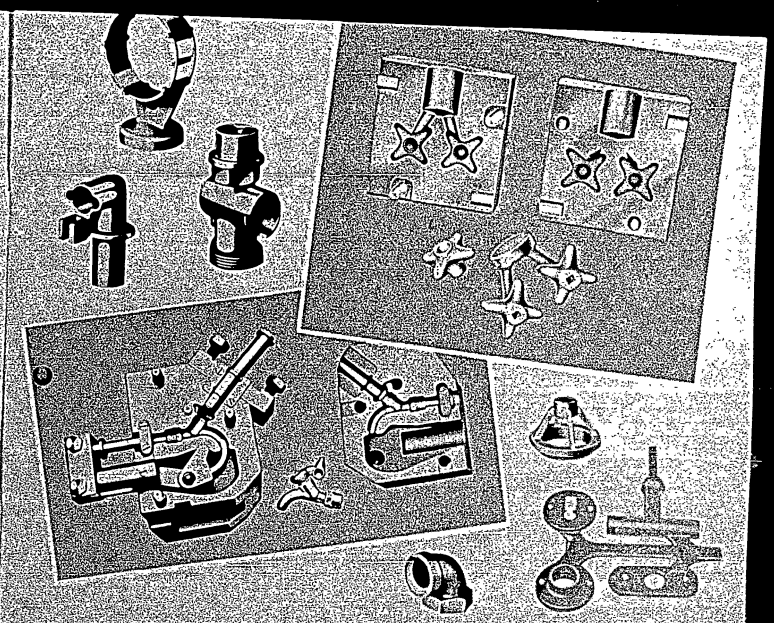
Economy of production

The Polák 408 pressure diecasting machine is especially well-suited for the mass production of smaller and medium size components of intricate shape, where small weight and neat appearance are of prime importance. It produces castings of an unusual dimensional accuracy and a high-grade surface finish, requiring no subsequent machining. As a rule it is entirely sufficient to remove gates or burr and the castings are ready for assembly. The machine is ideal for the quantity production of parts in the automotive, electrical and optical industries, for builder's and plumber's hardware, household appliances, etc., as per illustrations on the rear of this catalogue.

Description and Operation of the Machine

The Polák 408 Machine is illustrated on the front page. It consists mainly of a rigid hollow frame of cast steel mounted on a solid base. The frame allows for easy access and facility of inspection of the die the stationary half of which is fixed on the left, and side of the frame, the movable half being mounted on the accurately guided dieholder of the closing piston.





The mechanism for opening and closing the die is arranged on the horizontal axis of the frame. The die closing is done by a small feeding piston with small consumption of pressure water. During the die closing the closing cylinder is filled with discharge water (without pressure) which is supplied from the hollow frame over a check valve. As the full closing pressure is exerted only at the moment of the die closing there is almost no consumption of pressure water at the locking. In the vertical axis of the frame a pressure cylinder is arranged fitted with a plunger which carries the easily interchangeable injection piston. With the parting line system the pressure chamber is provided under the injection piston (Fig. 2) which serves for casting alloys in a plastic state. When using the center-gate system the pressure chamber is arranged as per Fig. 3. The counter piston which is supported by a spring covers the gate prior to the injection of metal and thus prevents the metal from running prematurely into the die. As the injection piston acts on the metal the counter piston moves to its conical seat allowing the metal to enter freely the die. After the injection is completed the metal remaining in the pressure chamber is separated from the gate by the counter piston and ejected.

The Speed of the Injection Piston

can be regulated at will within the given limits.

The Control

is effected by a hand-operated single lever distributor fixed on the left of the machine. By shifting the lever to the horizontal position the closing action begins; by pressing it downwards the injection of metal proceeds. Only the forward strokes of the piston are controlled while the downward strokes are effected automatically by constant pressure.

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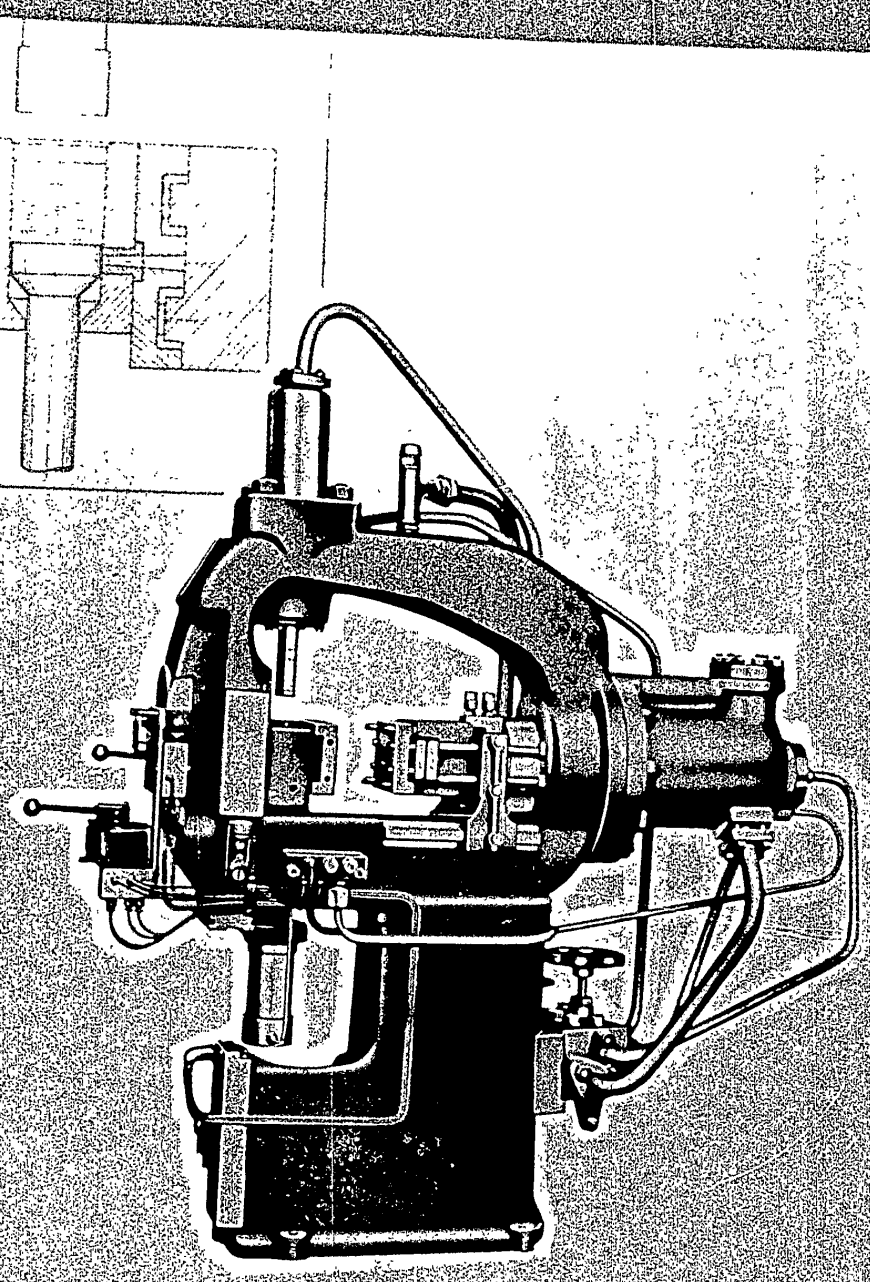

PRESSURE DIECASTING MACHINE

POLAK 408

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SPECIFICATION OF TYPE 600 MACHINE

Maximum permissible weight of casting—		Consumption of pressure liquid per shot, approx.	litres 6 — 1.3 gals
for alloys of heavy metals	kg 7.0 — 15 lbs	Floor space required for machine, approx.	mm 900 × 3300 — 35½ × 91
for aluminium alloys	kg 0.8 — 1.8 lbs	Maximum height above floor	mm 2500 — 99"
Maximum permissible area of casting in parting line of die—		Net weight of machine, approx.	kg 2100 — 4600 lbs
for alloys of heavy metals	cm² 130 — 19 sq. inches	Gross weight of machine, railway packing, approx.	kg 2300 — 5100 lbs
for aluminium alloys	cm² 500 — 80 sq. inches	Gross weight of machine, seaworthy packing, approx.	kg 2550 — 5600 lbs
Average production rate in 8 hours	shots 1000 to 1500	Measurements of packing case	metres 2.8×1.8×1.9 — 112"×71"×75"
Maximum locking force	tons 70		
Pressure applied to metal	tons 2.16.18		
Maximum opening of machine	mm 650 — 25"		
Minimum opening of machine (minimum height of die including clamping box)	mm 310 — 12"		

Type RP XII Pump

Output of pump	litres per min. 30 — 8 gals per min.	Gross weight, railway packing, approx.	kg 850 — 1850 lbs
Speed of pump	r.p.m. 510	Gross weight, seaworthy packing, approx.	kg 770 — 1700 lbs
Speed of motor	r.p.m. 1440	Measurements of packing case	metres 1.1×2.25×1.0 — 43"×89"×41"
Output of motor	kW 1.15		
Floor space required for pump with motor, approx.	mm 800 × 3000 — 32" × 79"		
Net weight, approx.	kg 570 — 1260 lbs		

250 Litre (55 Gal) Accumulator

Contents of bottle	litres 250 — 55 Gal	Gross weight, railway packing, approx.	kg 790 — 1730 lbs
Working pressure	atm 120 — 1700 psi	Gross weight, seaworthy packing, approx.	kg 820 — 1750 lbs
Floor space required	mm 800 × 800 — 32" × 32"	Measurements of packing case	metres 4×1×0.8 — 132"×39"×31"
Height above floor, approx.	mm 3440 — 136"		
Net weight, approx.	kg 670 — 1490 lbs		

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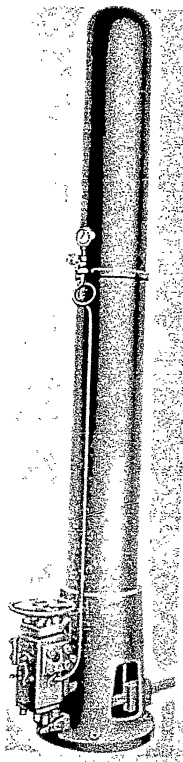
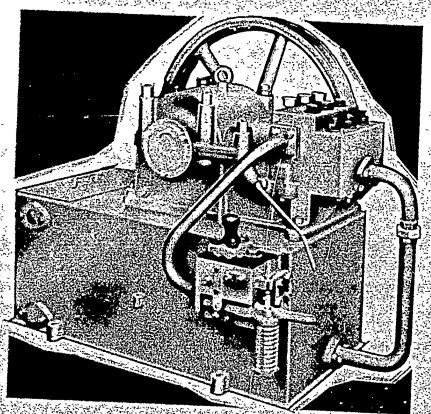


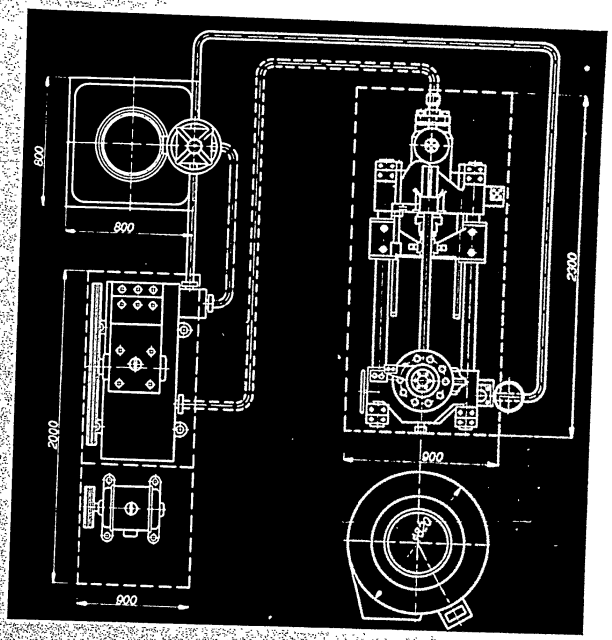
The pump

is a high speed unit, with horizontal pistons, of simple design, absolutely reliable in operation. It is driven by an electric motor and stops and starts automatically in accordance with a permissible rise or drop of pressure in the accumulator.

The accumulator

is a hydro-pneumatic unit with a capacity of 250 litres (55 gals). It ensures the immediate availability of the requisite quantity of pressure liquid and permits relatively high speeds and easy control of the closing and injection pistons to be achieved independent of the pump. The output of the pump and, as a result, the electric power consumption are very low.





The machine, pump and accumulator form the pressure diecasting equipment. Since each of these units forms an independent assembly the machine alone can, for instance, be connected to an existing pressure system. When a fairly large number of machines is being installed a central pressure piping with a central pumping plant can be set up.

We prepare plans of pressure diecasting plants of all sizes

We supply

Hydraulic core-pullers, hydraulic ejectors, working and melting furnaces, gas or oil fired.

We offer our advice on all problems concerning this branch

Our products are continuously being improved upon. The description, illustrations and particulars can therefore not always accurately agree with the latest design of machine and consequently are not binding.

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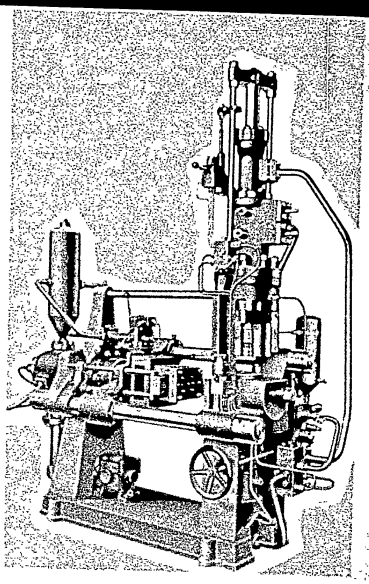


DESCRIPTION

The base plate is made of cast iron, reinforced with ribs. To the base plate two cast iron legs are bolted one of which carries the closing cylinder, the other the pressure stirrup with the pressure cylinder and pressure chamber.

The closing cylinder

is made of cast steel and is provided with two lugs for the attachment of two columns which join the closing assembly to the pressure assembly.

The closing piston

is made of high grade steel and its surface is carefully ground to reduce the wear of the sealing collars to a minimum. It consists of two parts, the inner small feeding piston and the main closing piston. The feeding piston closes the machine with a small force, the main piston drawing in discharge liquid (without pressure) from a tank arranged above the closing cylinder. The liquid is drawn in through a check valve. As soon as the two halves of the die come into contact the check valve closes and the pressure in the closing cylinder rises to the working pressure of 120 atm (1700 psi). The machine is closed by the mean-force. This arrangement results in a quick movement of the closing piston, a reduction of the consumption of pressure liquid and of the output of the pump. Thus the power consumption is reduced to a minimum.

The intensifier

raises the pressure of the liquid in the closing cylinder and thus develops the full closing force of the machine of 70 tons.

The pressure cylinder

is fitted to the pressure stirrup of the machine and is made of cast steel. It consists of two parts. The lower part in which the pressure plunger moves, is provided with a pressing force reducer and de-nerating valves, the upper part forms the so called return cylinder in which a plunger moves which returns the injection piston to its original position.

The pressure plunger

and return plunger are made of high grade steel and carefully ground to reduce the wear of sealing collars to a minimum. To the pressure plunger the injection piston is fitted in a simple manner by means of an extension. This piston is easy to replace.

The pressure stirrup

is made of cast steel and, like the closing cylinder, provided with two lugs for the attachment of the columns. In the stirrup

the cold pressure chamber

is fitted the important parts of which are the cylinder and the gate. These parts are made of special alloy steel to withstand the high thermal and mechanical stresses.

The two horizontal columns

join the closing cylinder to the pressure stirrup. They are made of high grade steel to safely transmit the full closing force of the machine. The arrangement of the columns, which are transversally placed above each other and at an adequate height above the base plate, permits dies with core-pullers in all four walls to be fitted. The space for the die is limited by the columns as little as possible and the casting can always be placed in the die in a position satisfying the requirement of a correct position of the gate.

The stationary half of the die

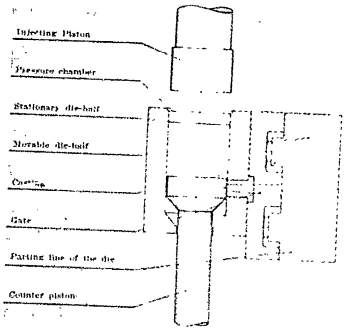
is attached to the pressure-stirrup. It is provided on its seating surface with a recess for the head of the gate.

The movable half of the die

is attached to the die carrier.

The die carrier

is made of cast steel. It is attached to the closing piston and provided with exchangeable bushes by means of which it is guided on the guide rods.



The small hand distributor

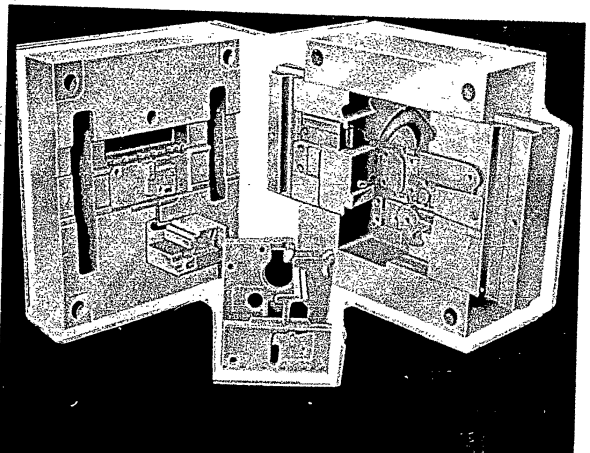
fitted to the pressure stirrup at a convenient height controls the various movements of the machine i. e. closing, injection and opening. It has a single lever with [illegible]

Hydraulic core-pullers

In view of the non-flammable pressure medium used hydraulic core pullers are used [illegible] throughout. The core-pullers are of simple design, produce considerable forces are [illegible] be used for any die. They considerably simplify the design of dies and reduce their [illegible]

Hydraulic ejectors

In cases where automatic ejection of castings cannot be used and hand [illegible] pinion would be too tiring hydraulic ejectors are used.



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PRESSURE DIECASTING MACHINE WITH COLD PRESSURE CHAMBER FOR CASTING Al, Cu, Zn AND Mg ALLOYS.

25 YEARS OF EXPERIENCE IN BUILDING PRESSURE DIECASTING MACHINES WITH COLD PRESSURE CHAMBER.

25 YEARS OF EXPERIENCE IN MANUFACTURING DIES FOR PRESSURE DIECASTING OF METALS.

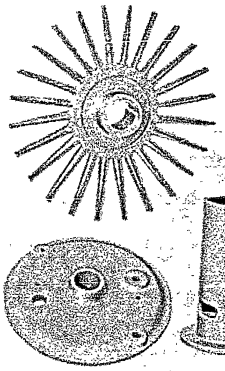
Continuous improvements
of design of these machines based on latest practical and theoretical discoveries.

Deliveries
to all industrial countries in Europe and overseas. All the above constitutes a guarantee that these machines will satisfy even the most exacting demands.

There is hardly a field in the manufacture of metal parts or objects in which castings produced in fairly large quantities by the pressure diecasting method have not proved superior to castings produced by other methods. That is only natural because

pressure diecastings
have a smooth surface corresponding to the surface of the die, have accurate dimensions and satisfy the requirements of interchangeability. They are fit for immediate assembling, as a rule without machining. They have good mechanical properties and considerable savings in weight are achieved by them. The lowest limit for the use of this method of production is a series of two to four thousand castings of the same kind.

Some examples of applications of the POLÁK 600 machine:



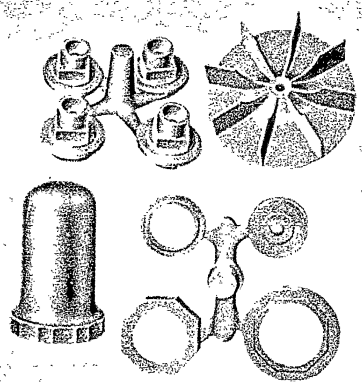
Automotive industry
Door handles, hardware, carburetor bodies, fuel pump bodies, distributors and various other parts of central lubrication systems, various minor decorative mouldings, etc.

Electrical engineering industry
power as well as communications. Telephone apparatuses and equipment, parts of precision measuring instruments, cable connectors, rotors, stators and end shields of small motors, electric conduit boxes, various indicating plates, cable terminals, etc.

Optical industry
Camera frames and other parts, telescope parts, parts of various optical instruments, etc.

Fittings industry
water taps, various nuts, parts of special shapes, water meter parts, hose connections, etc.

POLÁK 600



Refrigeration industry
Various door locks and handles, hinges, etc.

House hold appliance industry
and manufacture of metal articles of everyday use.

Building and furniture hardware
Door handles and shields, window handles and shields, hinges, grips, etc.

The POLÁK 600 Pressure Diecasting Machine
is fully hydraulic, capable of producing casting of zinc or brass up to a weight of 1 kg (2,2 lbs) including the gates and up to an area in the parting line of 120 cm² (19 sq. inches); castings of aluminium up to a weight of 0,8 kg (1,8 lbs) including the gates and up to an area in the parting line of 200 cm² (31 sq. inches)

Outstanding Features
- High output of castings of all kinds of various alloys.
- Simple operation and easy access to all important parts and to the hydraulic line.
- Sturdy design, high grade workmanship and correctly selected material with a view to the high closing and pressing forces which the machine is capable to develop.
- Ease of control and guaranteed correct sequence of individual operations.
- Hydraulic closing of die, permitting the fitting of dies of various heights without any adjustment of the closing parts of the machine.
- Cold pressure chamber enabling all alloys suitable for diecasting as known hitherto to be cast — indispensable for casting aluminium and brass alloys.
- High specific pressure upon the metal ensuring smooth surface and good mechanical properties of the castings.
- Cheap and safe operation. There is no fire hazard, the pressure liquid used being an emulsion of water and oil with a pressure of 120 atm (1700 psi).

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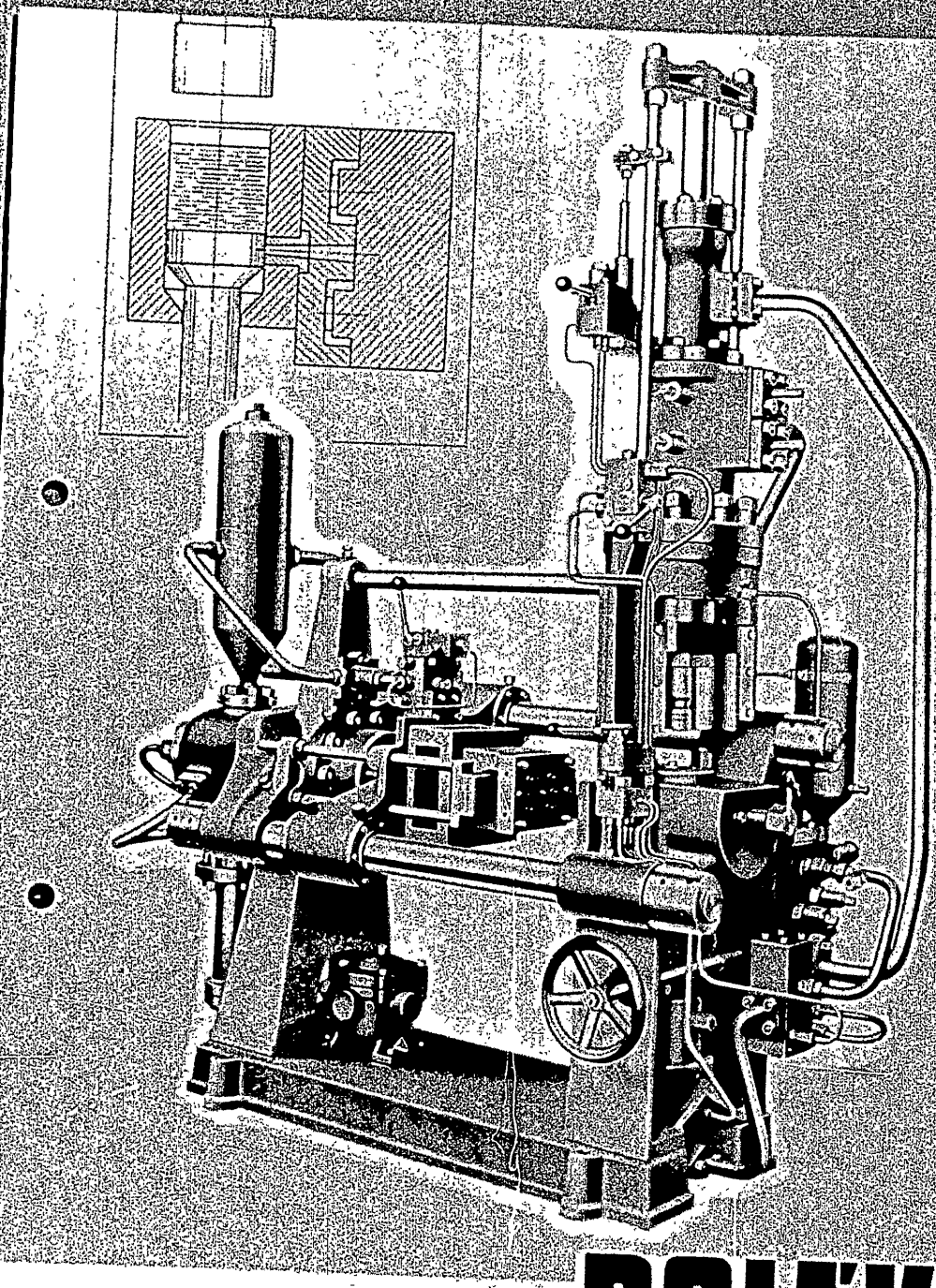

PRESSURE DIECASTING MACHINE

POLAR 600

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SPECIFICATION OF POLÁK TYPE 5065 MACHINE

Maximum permissible weight of casting:		Minimum opening of machine without spacer block	mm 1600 — 63"
for alloys of heavy metals	kg 15 — 33 lbs	Minimum opening of machine with spacer block	mm 400 — 16"
for aluminium alloys	kg 15 — 33 lbs	Consumption of pressure liquid per shot, approx.	litres 90 — 20 gals
Maximum permissible area of casting in parting line of die:		Floor space required for machine, approx.	mm 7000 × 2900 — 23' × 9'7"
for alloys of heavy metals	cm² 800 — 124 sq. inches	Maximum height above floor	mm 3250 — 11'6"
for aluminium alloys	cm² 1500 — 233 sq. inches	Maximum depth below floor	mm 1800 — 5'11"
Average production rate per hour — depending on casting	shot 10 to 50	Net weight of machine, approx.	kg 22500 — 49600 lbs
Maximum die closing force	tons 500	Gross weight of machine, railway packing, approx.	kg 23900 — 52700 lbs
Pressure applied to metal	tons 11 to 44 to 70	Gross weight of machine, seaworthy packing, approx.	kg 26500 — 58400 lbs
Maximum opening of machine without spacer block	mm 2300 — 90"		
Maximum opening of machine with spacer block	mm 1000 — 39"		

Type RP XXX Pump

Output of pump	litres per min. 100 — 22 gals per min.	Floor space required for pump with motor, approx.	mm 1200 × 3400 — 48" × 95"
Speed of pump	r. p. m. 340	Net weight, approx.	kg 900 — 1950 lbs
Speed of motor	r. p. m. 1440	Gross weight, railway packing, approx.	kg 1050 — 2310 lbs
Output of motor	kW 26	Gross weight, seaworthy packing, approx.	kg 1250 — 2840 lbs

750 Litre (165 gal) Accumulator — Three-Bottle

Contents of bottle	litres 750 — 165 gal	Net weight, approx.	kg 2115 — 4600 lbs
Working pressure	atm 120 — 1710 psi	Gross weight, railway packing, approx.	kg 2400 — 5200 lbs
Floor space required	mm 1100 × 1000 — 43" × 39"	Gross weight, seaworthy packing, approx.	kg 2900 — 6170 lbs
Height above floor, approx.	mm 3900 — 153"		

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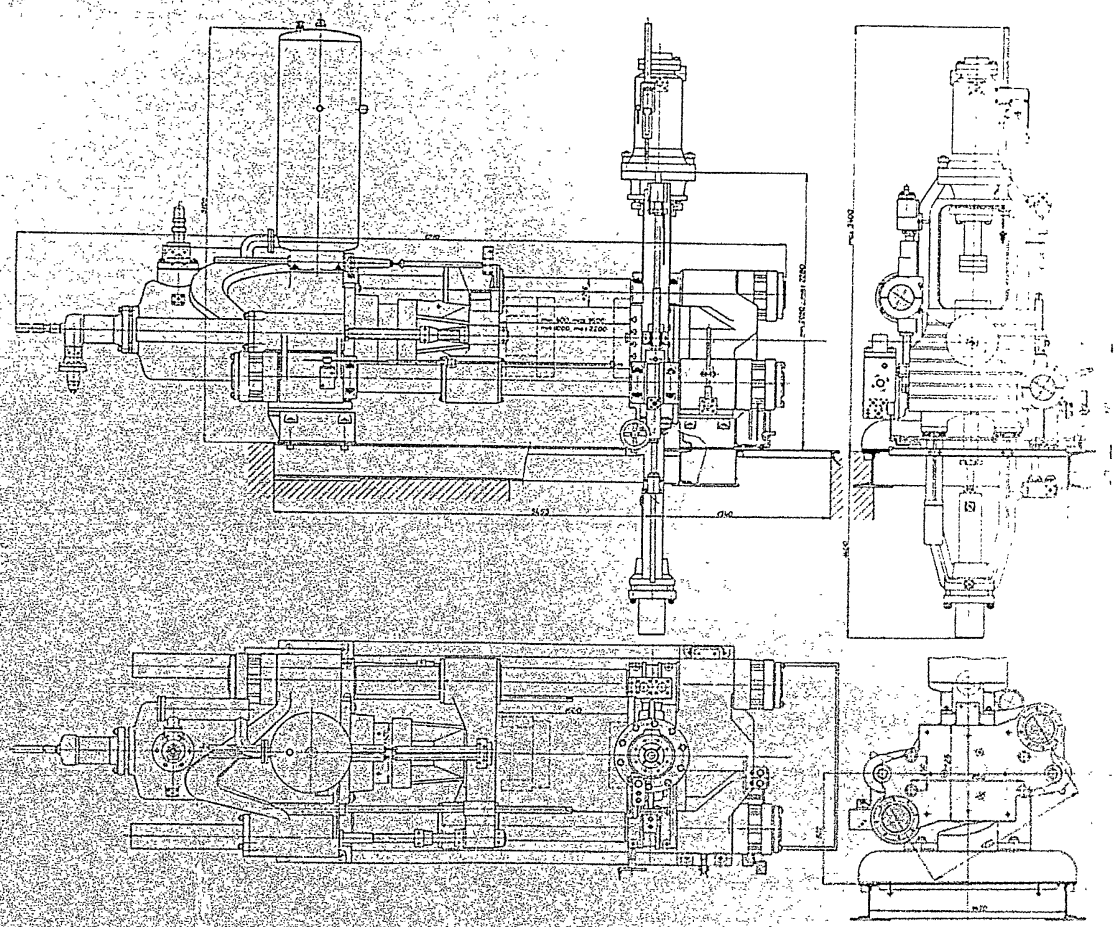

The machine, pump and accumulator form the pressure diecasting equipment. Since each of these units forms an independent assembly a central pressure piping with a central pumping plant can be set up when a fairly large number of machines is being installed.

We supply

Hydraulic core-pullers
Hydraulic ejectors
Working and melting furnaces, gas or oil fired.

We manufacture dies for diecasting of metals.

We prepare plans for pressure diecasting plants of all sizes.

We offer our advice on all problems concerning this branch.

Our products are continuously being improved upon. The description, illustrations and particulars can therefore not always accurately agree with the latest design of machine and consequently are not binding.

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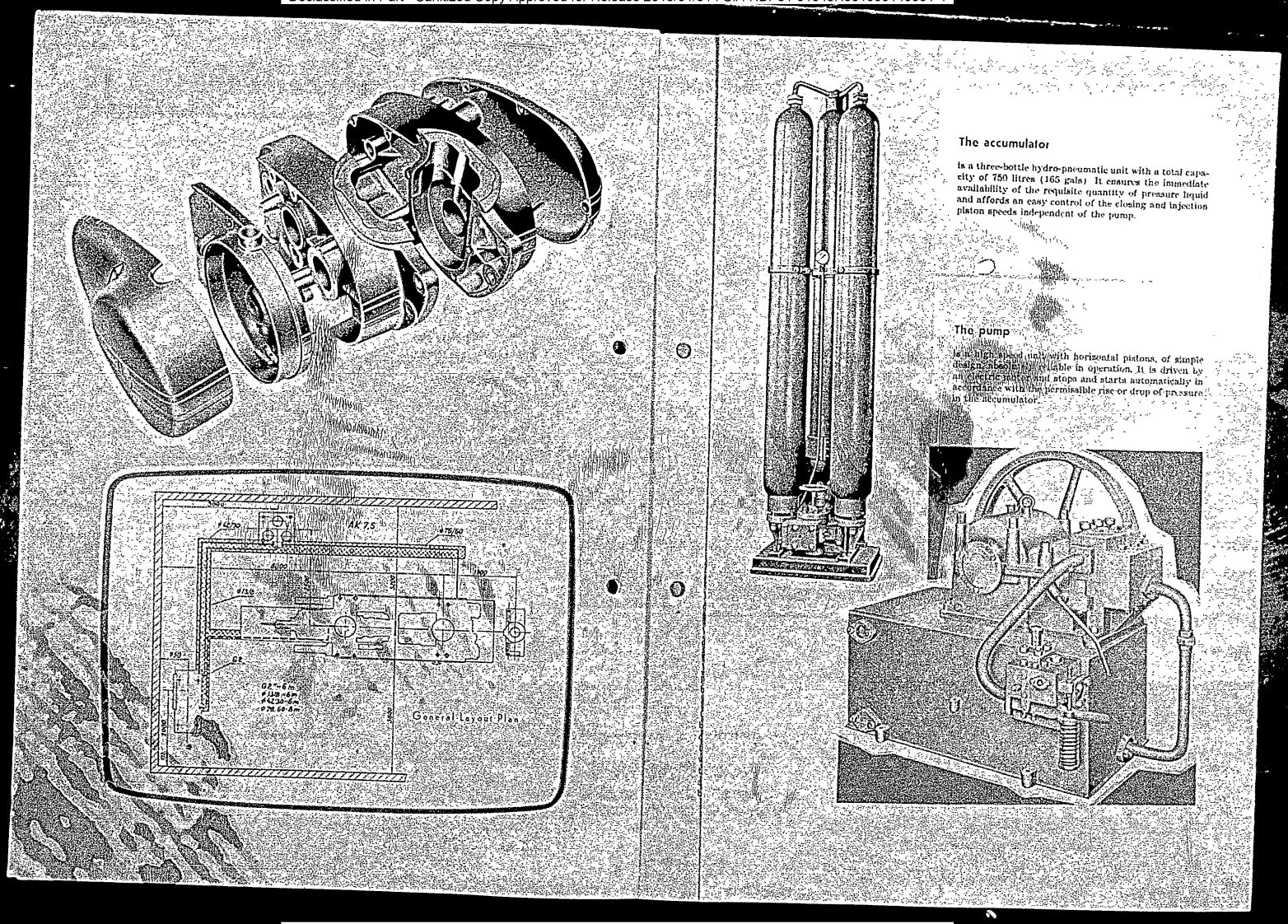

The accumulator

is a three-bottle hydro-pneumatic unit with a total capacity of 750 litres (165 gals). It ensures the immediate availability of the requisite quantity of pressure liquid and affords an easy control of the closing and injection piston speeds independent of the pump.

The pump

is a high-speed unit with horizontal pistons, of simple design, absolutely reliable in operation. It is driven by an electric motor and stops and starts automatically in accordance with the permissible rise or drop of pressure in the accumulator.

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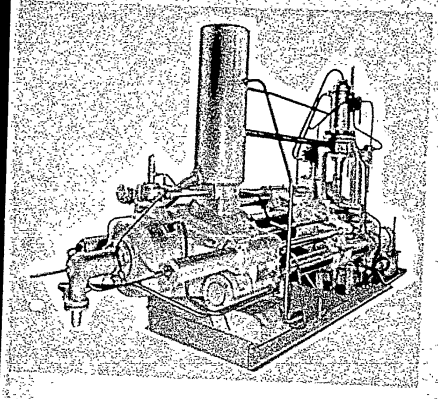


DESCRIPTION

The type 5065 Pressure Diecasting Machine

consists of the vertical hydraulic part known as the pressure stirrup in which the pressure chamber and the hydraulically operated counter piston are fitted, and of the horizontal closing cylinder. The two parts are joined by two columns.

The base plate

is welded of heavy mild steel sections.

The closing cylinder

is made of cast steel and provided with two lugs for the fitting of the hydraulic cylinders which move the closing piston, i. e. close and open the machine. In addition to that the cylinder has two further big lugs for the attachment of the columns joining the closing cylinder to the pressure stirrup.

The powerful closing piston

is made of special material and its surface is carefully ground to reduce the wear of sealing collars to a minimum. The piston is moved by two hydraulic cylinders fitted on either side of the closing cylinder and connected with the die carrier by means of pull-rods. When the closing piston moves forward, i. e. when the machine is being closed, the closing piston draws discharge liquid (without pressure) into the cylinder from a tank arranged above this cylinder. The liquid is drawn in through a filter and a check valve which is controlled. At the moment of closing of the machine, i. e. as soon as the two halves of the die come into contact, the check valve closes and the pressure of liquid in the closing cylinder rises to the working pressure, i. e. to 120 atm. (1700 psi). The machine is closed by the mean force. This arrangement reduces the consumption of pressure liquid to a minimum.

The intensifier

raises the pressure of the liquid in the closing cylinder to 320 atm. (4550 psi) and thus develops the full closing force of the machine of 500 tons.

The pressure cylinder

is fitted to the pressure stirrup of the machine and is made of cast steel. It is provided with a pressing force reducer and de-aerating valves.

The pressure plunger

is made of steel and ground. To the pressure plunger the injection piston is fitted by means of an extension. It is easy to replace.

The pressure stirrup

is made of cast steel and consists of two parts. One part of big dimensions with lugs for the two columns is the carrying part and transmits the full closing force. To this part the pressure stirrup proper is fitted in such a way that its position can be adjusted vertically. That permits castings with a sub-under to be always placed in the die in a position in which there can be no lateral gaping so that the danger of metal spraying from the parting line is avoided.

The cold pressure chamber

is fitted in the pressure stirrup. It consists of the filling box, which is provided with channels for water cooling the cylinder and the gate. Its bottom is formed by the counter piston which has an up and down movement and is hydraulically operated. The cylinder and gate are made of special alloy steel to withstand the high thermal and mechanical stresses.

The two sturdy horizontal columns

join the closing cylinder to the pressure stirrup. They transmit the full closing force and also serve as guides for the die carrier. They are placed transversally above each other so that the die is easily accessible from all sides.

The die carrier

is made of cast steel. In case of high dies it is bolted directly to the closing piston. In case of lower dies a spacer block is fitted between the closing piston and the die carrier. The carrier is provided with exchangeable bushes of generous dimensions by means of which it is guided into the columns.

The hand distributor

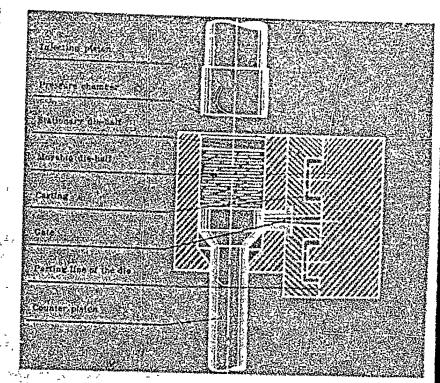
fitted to the pressure stirrup at a convenient height controls the various movements of the machine.

The fixed half of the die

is attached to the pressure stirrup. It is provided on its seating surface with a recess for the head of the gate.

The moving half of the die

is attached to the die carrier by means of the clamping box.



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5065

POLÁK 5065 PRESSURE DIECASTING MACHINE WITH COLD PRESSURE CHAMBER

The direct transformation of material into the finished product

is an ideal which pressure diecasting closely approaches.

Pressure diecasting

into permanent metal dies produces castings with a smooth surface which corresponds to the surface of the die. The dimensions of the castings can be kept within close limits. Castings from the same die are practically absolutely identical and satisfy the requirement of interchangeability. In the majority of cases they need not be machined at all and can be fitted immediately.

High strengths

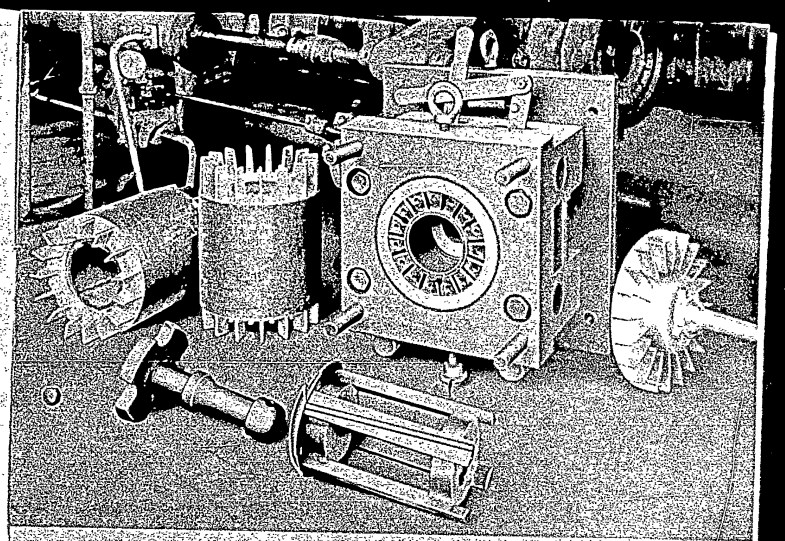
of castings result in a considerable saving of material in view of the fact that walls can be made thinner.

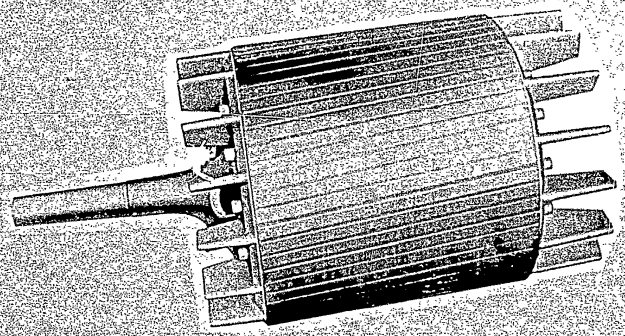
Some examples of applications of the POLÁK 5065

Crank cases, crank case covers and cylinder heads of motor cycle engines — Rotors, stators, end shields and fans of electric motors — Frames and parts of typewriters and calculating machines — Parts of automatic scales for shops — Frames and stands of various optical and measuring instruments — Parts of household refrigerators, vacuum cleaners, floor polishers and various other household appliances. Various other castings whenever the quantity required exceeds 2 to 4000 and where their surface, weight, accurate dimensions and mechanical properties are of importance.

OUTSTANDING FEATURES

- High rate of production of accurate, high grade castings.
- Two-column design limiting the access to the die to a very small extent. The fitting of the die is quick and its inspection during operation easy.
- Hydraulic closing of die. Dies of various heights can be fitted without any adjustment of the closing parts of the machine.
- Wide opening of machine permits even abnormally high dies to be fitted.
- Cold pressure chamber and high specific pressure upon metal. The casting temperature of the metal is the lowest possible which considerably increases the life of the die.
- Vertical arrangement of pressure chamber eliminates the possibility of air being forced into the hollow of the mould which would produce air bubbles in the casting.
- Simple operation and easy access to all important parts and to the hydraulic line.
- Simple and reliable control.
- Safe operation-no fire hazard, the pressure liquid used being an emulsion of water and oil.





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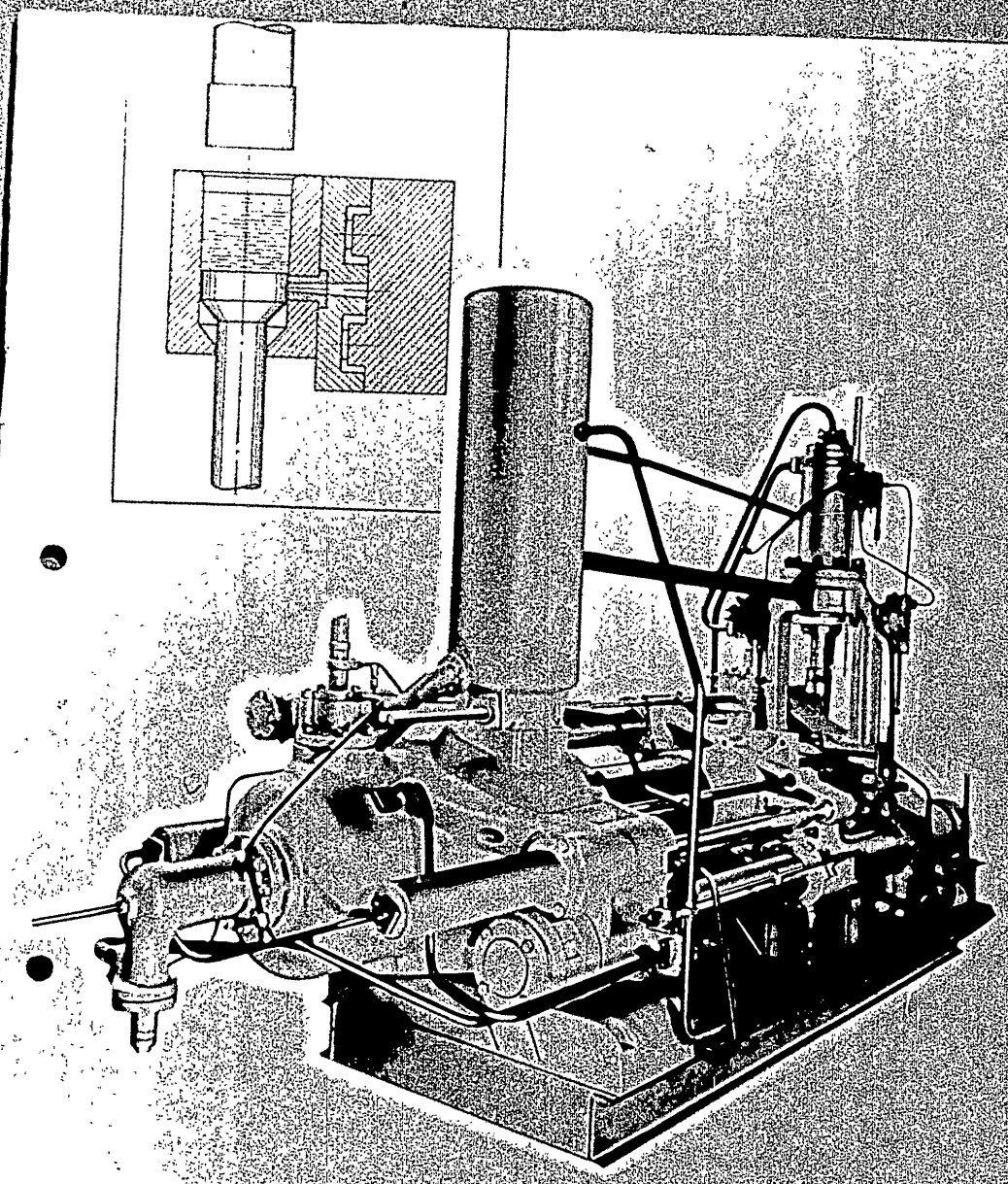

PRESSURE DIECASTING MACHINE

PDM 5065

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FSO

Specification

Diameter of spindle	mm	80	3 1/2"
Taper in spindle	Morse No.	5	5
Max. diameter for boring	mm	450	17 3/4"
Max. diameter for facing	mm	710	28"
Continuous/Additional feed to spindle	mm	710/355	28"/14"
Max./Min. distance centreline of spindle to top of table	mm	8—900	0—35 1/2"
Max. distance facing head to bar support	mm	2240	88 1/2"
Diameter of facing head	mm	480	18 7/8"
Centering dia. of facing head	mm	250 H6	250 H6
Width of facing head centering surface	mm	6	1/4"
Working surface of table (width × length)	mm	900 × 1120	35 1/2" × 44 1/4"
Centering dia. of table	mm	140 H6	140 H6
Width of table centering surface	mm	6	1/4"
Automatic cross travel of table	mm	1000	39 1/2"
Automatic longit. travel of table when in cross position	mm	1100	43 1/2"
Automatic longit. travel of table when in longit. position	mm	1000	39 1/2"

Speed Range:			
Number of spindle speeds		18	18
Low speed band I. speeds to spindle and facing head	r. p. m.	5.6—31.5	5.6—31.5
Middle speed band II: speeds to spindle	r. p. m.	26—150	26—150
speeds to facing head	r. p. m.	22.4—125	22.4—125
High speed band III: speeds to spindle and facing head	r. p. m.	180—1060	180—1000

Feeds:			
32 feeds to spindle per revolution	mm/rev.	0.02—12	.0008"—.5"
32 vertical feeds to headstock per spindle revolution	mm/rev.	0.02—12	.0008"—.5"
32 longitudinal feeds to table per spindle revolution	mm/rev.	0.02—12	.0008"—.5"
32 cross feeds to table per spindle revolution	mm/rev.	0.02—12	.0008"—.5"
32 feeds to facing head per spindle or facing slide revolution	mm/rev.	0.02—12	.0008"—.5"
32 circular feeds to table per spindle revolution (referring to dia. 1000 mm)	mm/rev.	0.035—20	.00137—.87
18 feeds to immobilized spindle	mm/min.	12.5—600	1/2"—24"
18 vertical feeds to headstock	mm/min.	12.5—600	1/2"—24"
18 longitudinal feeds to table	mm/min.	12.5—600	1/2"—24"
18 cross feeds to table	mm/min.	12.5—600	1/2"—24"
18 feeds to facing slide	mm/min.	12.5—600	1/2"—24"
18 automatic circular feeds to table on 1000 mm (39 1/2") dia.	mm/min.	22.5—1050	7/8"—41 1/2"
Rapid traverse to spindle, headstock, table and facing slide (except circular movement of table)	mm/min.	2400	95"
Rapid circular movement of table	r. p. m.	1.4	1.4

Threads:			
18 metric threads, pitch	mm	0.25—12	
25 Whitworth threads, pitch	t. p. i.		2—120
R. p. m. of motor		1500	1500
HP of motor		7.5	7.5
Floor space required (width × length)	mm	2450 × 4950	96" × 240"
Net weight of machine with standard equipment	kg	8150	18000 lbs
Weight of machine with packing	kg	9450	20800 lbs
Weight of machine with seaworthy packing	kg	9600	21200 lbs
Contents boxed	m³	27	950 cu. ft.

IN ORDERING, SPECIFY PHASE, VOLTAGE AND FREQUENCY OF POWER SUPPLY!
As improvements in design are continually being made, this specification is not to be regarded as binding in details and dimensions are subject to alteration without notice.

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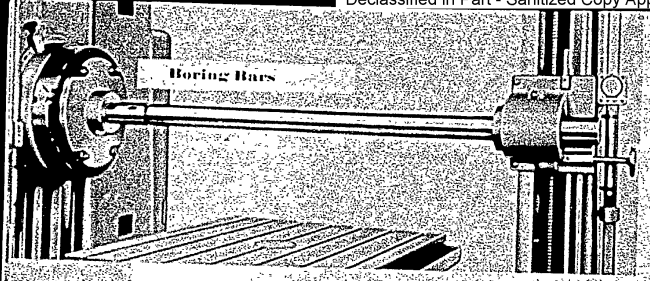
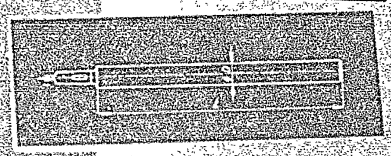
Boring Bars



Normal boring bars

Type	Morse taper	D f 6	L	Dia. of spindle
VT 80	5	32	1000	80
	5	50	1600	80
	5	63	1250	80
	5	63	2000	80
	5	80	1600	80
	5	80	2500	80



Abnormal boring bars

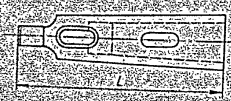
Type	Morse taper	D f 6	L	Dia. of spindle
VTA 80	5	40	1400	80
	5	40	2000	80
	5	45	1800	80
	5	50	1400	80
	5	50	2000	80
	5	55	1400	80
	5	60	1800	80
	5	60	2000	80
	5	70	2000	80
	5	70	2200	80
	5	*) 80	2000	80
	5	90	2500	80
	5	100	2200	80

*) The boring bars from dia. 80 mm upwards have the mounting (7

When ordering, state the type of plain boring bar according to its diameter, length and taper.
Example: VTA 60 dia. 40/1400/5

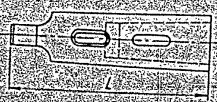
Reducing sleeves

Type	RV 80, 5/3	RV 80, 5/4
Reduction of Morse taper	5/3	5/4
External Morse taper	5	5
Internal Morse taper	3	4
Length L mm	170	170



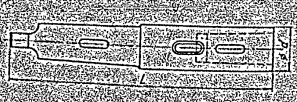
Reducing sleeves, short type

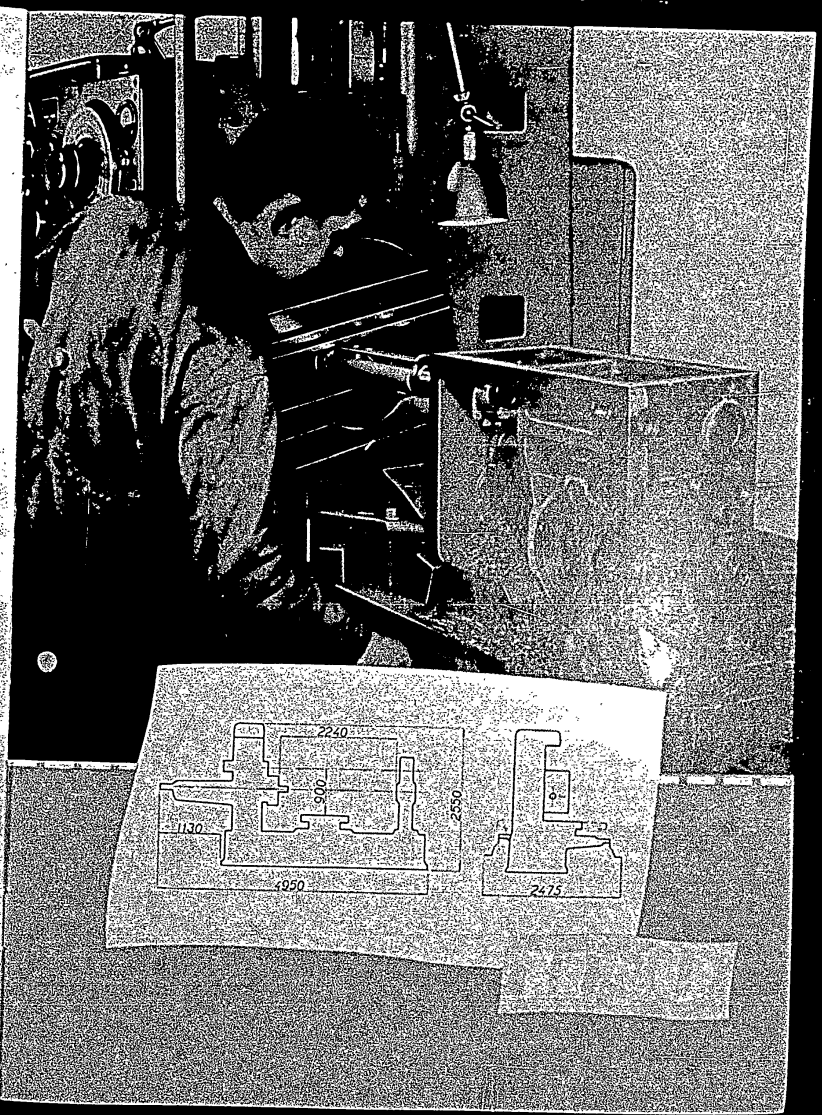
Type	RVK 80, 5/3	RVK 80, 5/4
Reduction of Morse tapers	5/3	5/4
External Morse taper	5	5
Internal Morse taper	3	4
Length L mm	156	162



Reducing sleeves, long type

Type	RVP 80, 5/3	RVP 80, 5/4
Reduction of Morse tapers	5/3	5/4
External Morse taper	5	5
Internal Morse taper	3	4
Total length L mm	270	300
Diameter d mm	38	48





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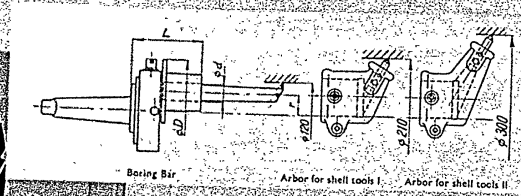
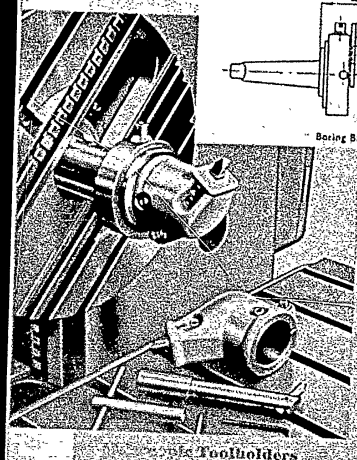
Adjustable Boring Attachments

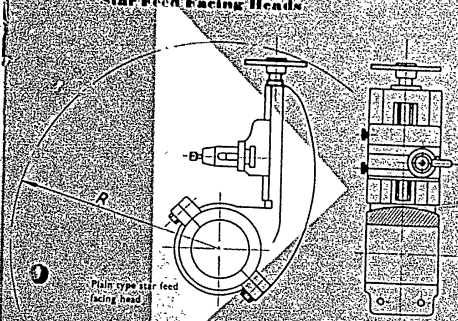


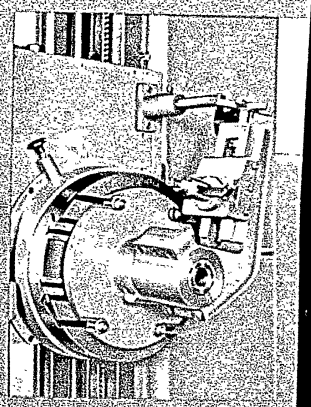


Type		PVP 80
Range of turning with boring bar	mm	35 to 120
Range of turning with arbor for shell tools I	mm	120 to 210
Range of turning with arbor for shell tools II	mm	210 to 300
Adjustment of bore slide "r"	mm	35
Diameter of tool hole in boring bar "d"	mm	30H7
Length of tool block without boring bar "L"	mm	120
Maximum Diameter with adjusted tool block "D"	mm	183
Morse Taper		5

The scale enables the adjustment of tool by 0,01 mm

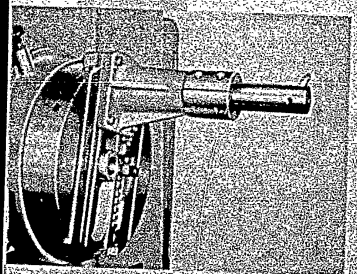
Star Feed Facing Heads

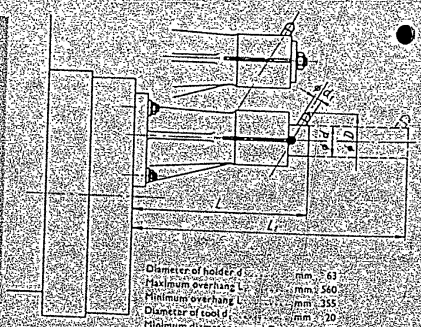




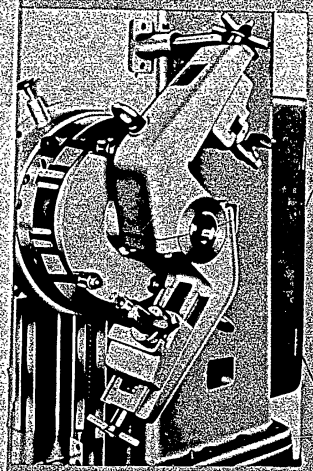
Length of hub	mm	165
Max. diameter turned	mm	550
Min. diameter turned	mm	250
Radius of circle R	mm	485
Dimensions of tool	mm	16 x 25

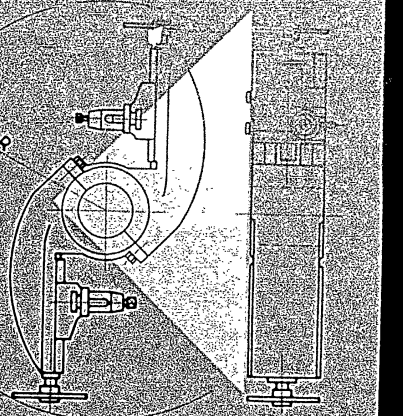
Toolholders





Diameter of holder d	mm	63
Maximum overhang L	mm	560
Minimum overhang L	mm	355
Diameter of tool d	mm	20
Minimum diameter turned D	mm	90





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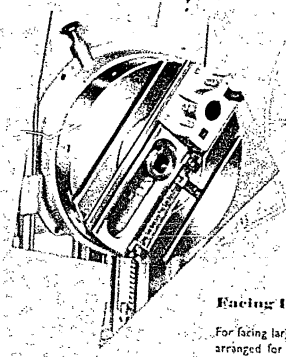


Facing Head

For facing large flanges the machines can be furnished with a facing head arranged for hand and automatic cross feed. The facing head is fitted with a tool block for holding 2 square tools and with a circular hole to receive the tool post. D max. = 710 mm, d = 480 mm, d_1 = 250 H 6 mm.

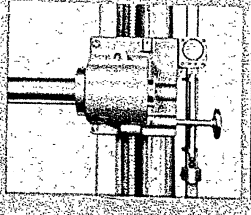
Optional Equipment

On request and at an extra charge the machines are supplied with the following attachments and optional equipment:

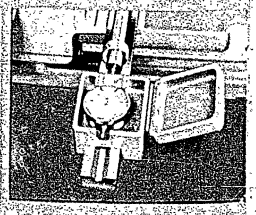
- ... attachments with electric pump ...
- ... attachment for vertical adjustment of ... headstock by means of end gauges (without end gauges and end rester),
- ... attachment for cross adjustment of table ... end gauges and indicator),
- ... attachment for vertical adjustment of boring bar supports, boring bar supports, locating and ... ation spindle support,
- clamping elongation spindle support,
- taper boring attachment,
- detachable boring attachment,
- telescopic tool block,
- single or double-arm star feed facing head,
- reducing sleeves,
- boring bars,
- soot light.

Attachment for Precision Adjustment of Headstock, Table and Boring Bar Support

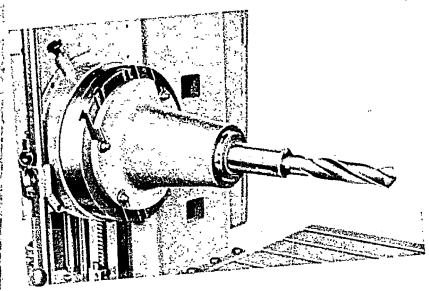
By using end gauges and the dial indicator, this attachment is fully independent of scales and verniers normally supplied with the machine, and increases the accuracy of setting up to 1/100 mm.

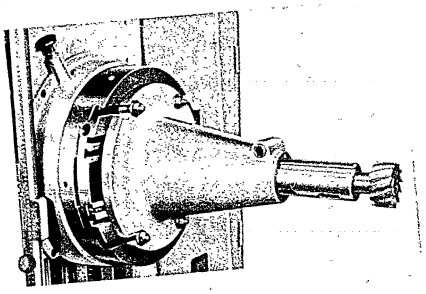


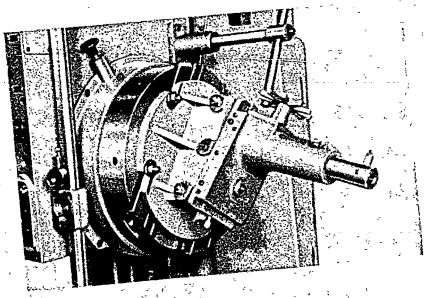
Attachment for cross adjustment of table by means of end gauges



Attachment for vertical adjustment of headstock by means of end gauges







Clamping and Feeding Elongation Spindle Supports

Length L	mm 325
Diameter D	mm 250

Taper Boring Attachments

Diameter of tool holder	mm 50
Adjustment of tool holder	mm 125
Maximum swing	15°
Length of block	mm 420
Feed	mm per rev. 0.1

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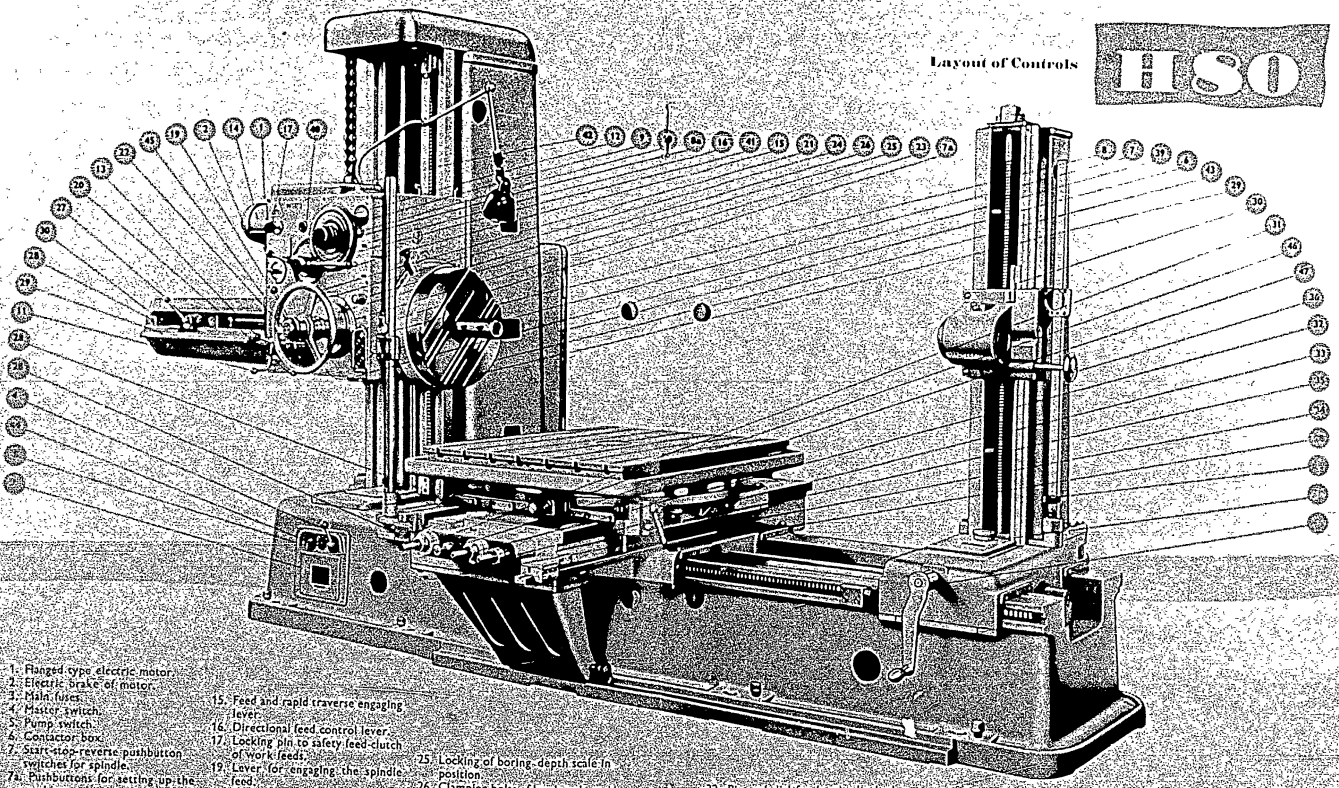
Layout of Controls

HSO



1. Flanged type electric motor.
2. Electric brake of motor.
3. Main fuses.
4. Master switch.
5. Pump switch.
6. Contactor box.
7. start-stop-reverse pushbutton switches for spindle.
7a. Pushbuttons for setting up the machine.
8. Pilot bulb.
8a. Pilot bulb of spindle speed selection.
9. Ammeter.
10. Knob for speed selection dial.
11. Speed selection lever.
12. Feed and thread pitch dial.
13. Feed range lever.
14. Servomotor.
15. Feed and rapid traverse engaging lever.
16. Directional feed control lever.
17. Locking pin to safety feed-clutch of work feeds.
19. Lever for engaging the spindle feed.
20. Directional control lever for facing head feed.
21. Central hand wheel for spindle, headstock, facing head and table adjustment.
22. Hand wheel for directional control of hand feed and for engaging the rapid traverse.
23. Boring-depth scale.
24. Vernier to boring depth scale 23.
25. Locking of boring depth scale in position.
26. Clamping bolts of headstock and longitudinal table.
27. Spindle locking lever.
28. Feed trip stops for automatic release of feed and rapid traverse in all directions except automatic circular table feed.
29. Scales.
30. Verniers to scales.
31. Pin and dial for cross adjustment of table by hand crank.
32. Pin and dial for longitudinal adjustment of table by hand crank.
33. Pin and dial for circular adjustment of table by hand crank.
34. Directional control lever for longitudinal, cross and circular motion of table.
35. Stop for accurate locking of table every 90 degrees.
36. Hand wheel for fine adjustment to boring bar support bearing.
37. Pin for adjusting the bar support on bed and vertical adjustment of boring bar support by a hand crank.
38. Handle for longitudinal or cross adjustment of boring bar support bearing by hand.
39. Oil level gauge.
40. Oil flow indicator.
41. Switch for continuous right or left rotation of main spindle.
42. Cover.
43. Face plate.
44. Electric light switch.
45. Box for change gears.
46. Pressure lubrication of cross slide.
47. Pressure lubrication of longitudinal slide.

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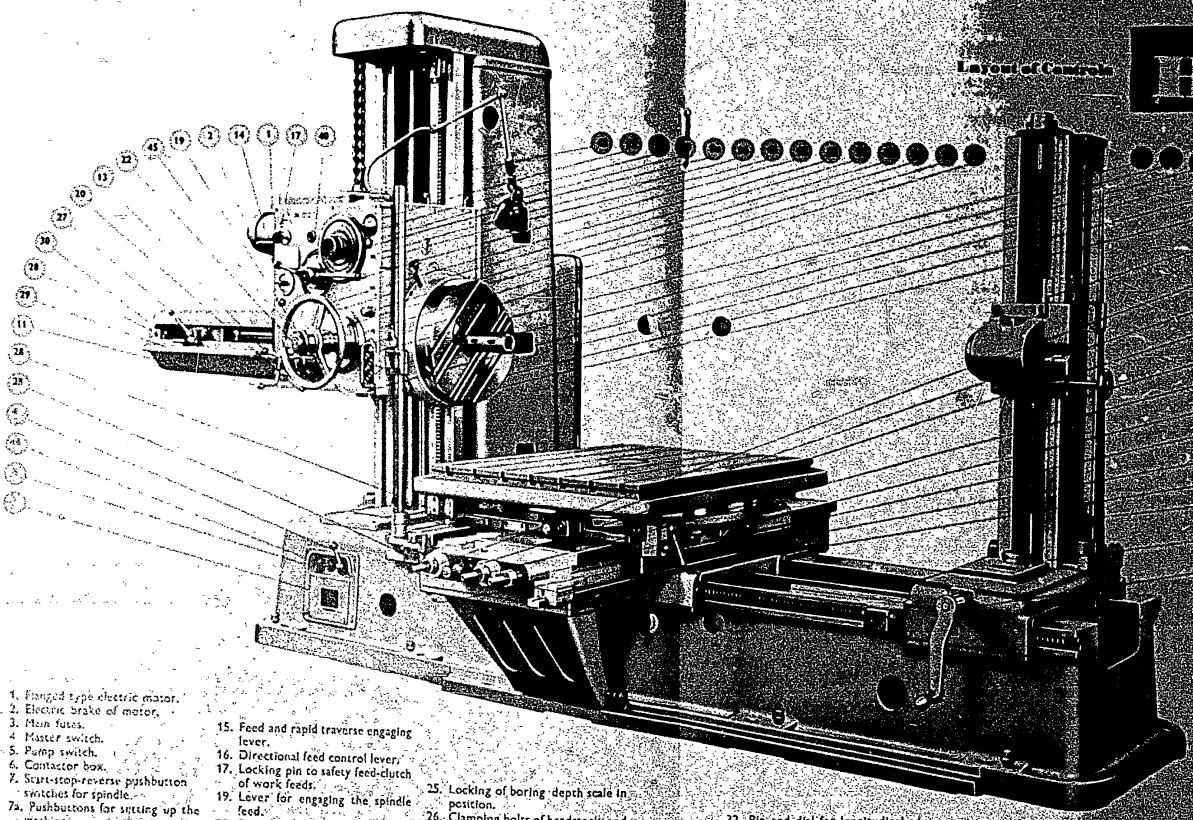
Layout of Controls

H80



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17. Locking pin to safety feed-clutch of work feeds.
19. Lever for engaging the spindle feed.
20. Directional control lever for facing head feed.
21. Central hand wheel for spindle, headstock, facing head and table adjustment.
22. Hand-wheel for directional control of hand feed and for engaging the rapid traverse.
23. Boring depth scale.
24. Vernier to boring depth scale 23.
25. Locking of boring depth scale in position.
26. Clamping bolts of headstock and longitudinal table.
27. Spindle locking lever.
28. Feed trip stops for automatic release of feed and rapid traverse in all directions except automatic circular table feed.
29. Scales.
30. Verniers to scales.
31. Pin and dial for cross adjustment of table by hand crank.
32. Pin and dial for longitudinal adjustment of table by hand crank.
33. Pin and dial for circular adjustment of table by hand crank.
34. Directional control lever for longitudinal, cross and circular motion of table.
35. Stop for accurate locking of table every 90 degrees.
36. Hand wheel for fine adjustment to boring bar support bearing.
37. Pin for adjusting the bar support on bed and vertical adjustment of boring bar support by a hand crank.
38. Handle for longitudinal or cross adjustment of boring bar support bearing by hand.
39. Oil level gauge.
40. Oil flow indicator.
41. Switch for continuous light on bed and vertical adjustment of boring bar support bearing.
42. Cover.
43. Face plate.
44. Electric light switch.
45. Box for change gear.
46. Pressure lubrication of cross slide.
47. Pressure lubrication of longitudinal slide.

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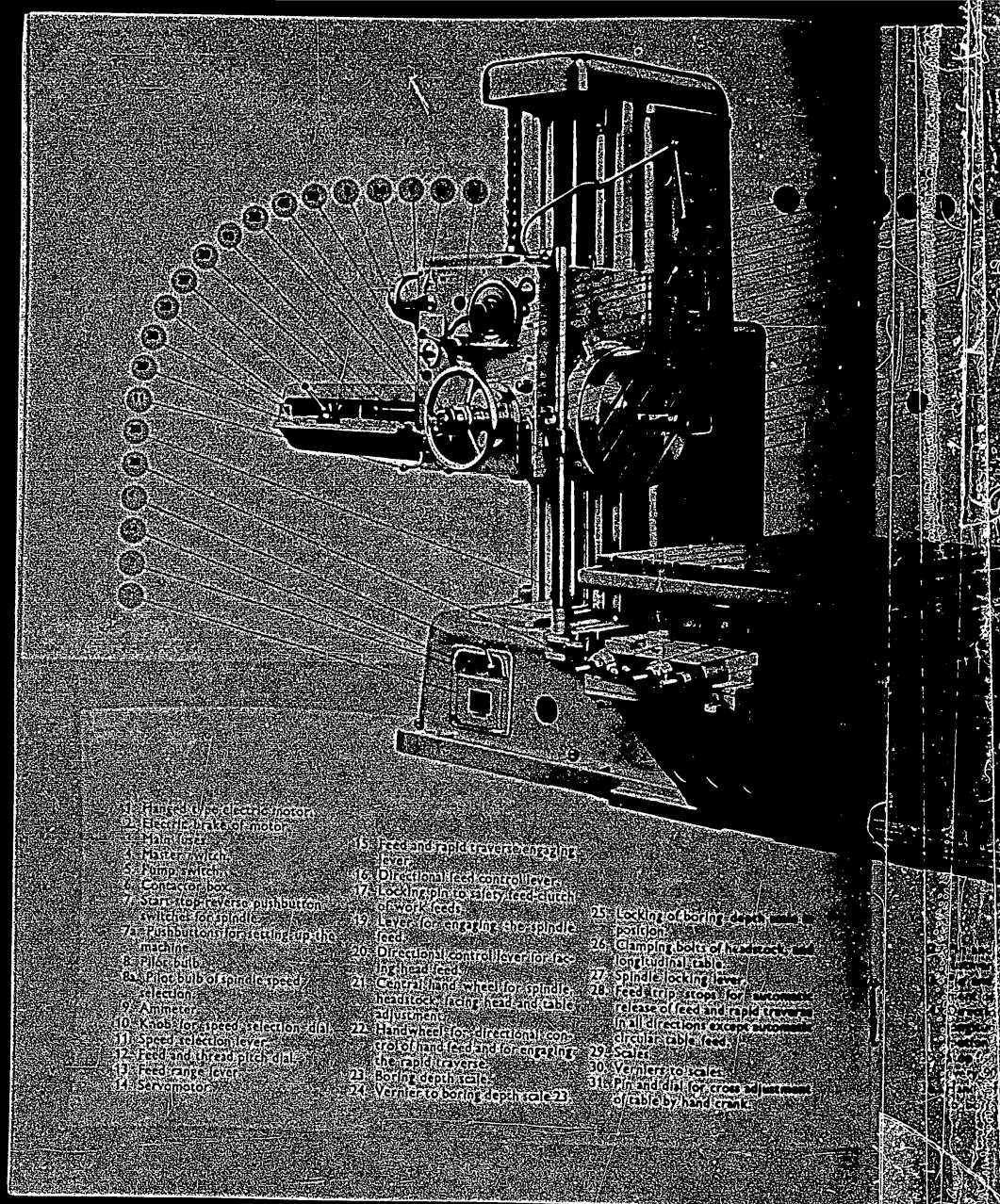

1. Flanged d.c. electric motor.
2. Electric brake of motor.
3. Main fuses.
4. Master switch.
5. Pump switch.
6. Contactor box.
7. Start-stop-reverse pushbutton switches for spindle.
7a. Pushbuttons for setting up the machine.
8. Pilot bulb.
8a. Pilot bulb of spindle speed selection.
9. Ammeter.
10. Knob for speed selection dial.
11. Speed selection lever.
12. Feed and thread pitch dial.
13. Feed range lever.
14. Servomotor.
15. Feed and rapid traverse engaging lever.
16. Directional feed control lever.
17. Locking pin to safety feed clutch of work feeds.
19. Lever for engaging the spindle feed.
20. Directional control lever for facing head feed.
21. Central hand wheel for spindle headstock facing head and table adjustment.
22. Hand wheel for directional control of hand feed and for engaging the rapid traverse.
23. Boring depth table.
24. Vernier to boring depth rate 23.
25. Locking of boring depth table in position.
26. Clamping bolts of headstock and longitudinal table.
27. Spindle locking lever.
28. Feed trip stops for automatic release of feed and rapid traverse in all directions except automatic circular table feed.
29. Scales.
30. Verniers to scales.
31. Pin and dial for cross adjustment of table by hand crank.

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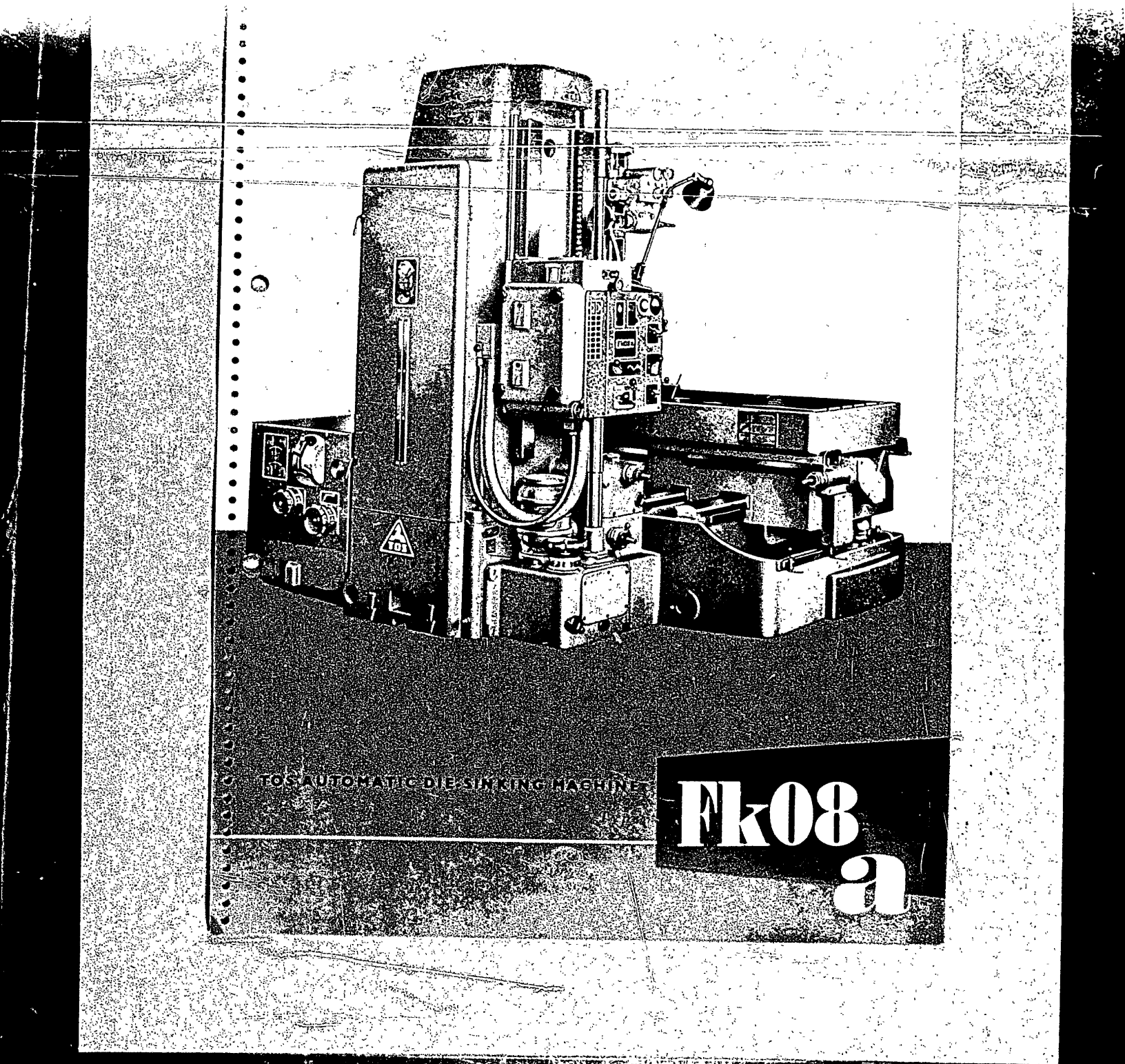

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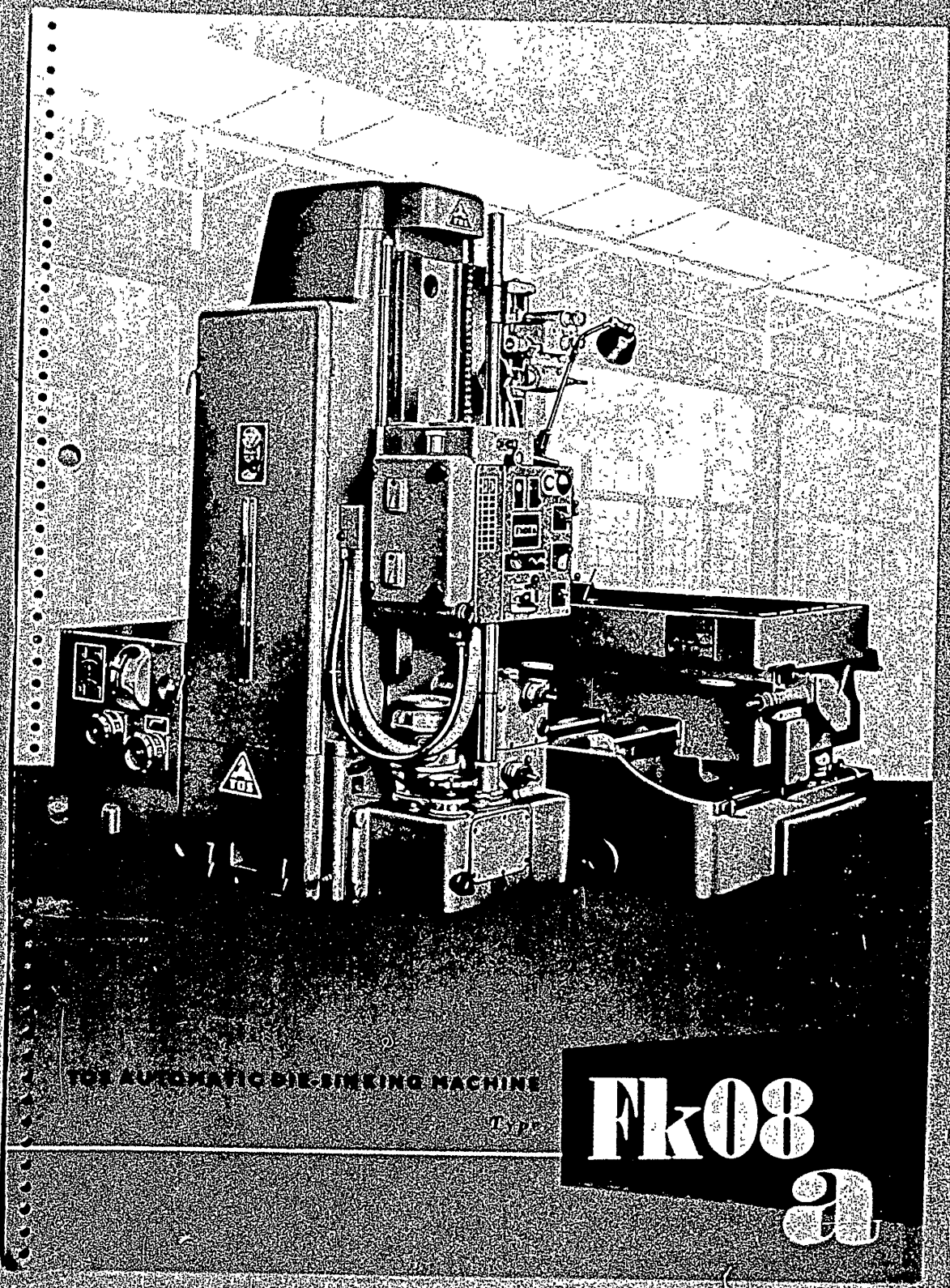

TOS AUTOMATIC DIE-SINKING MACHINE

Type

Fk08 a

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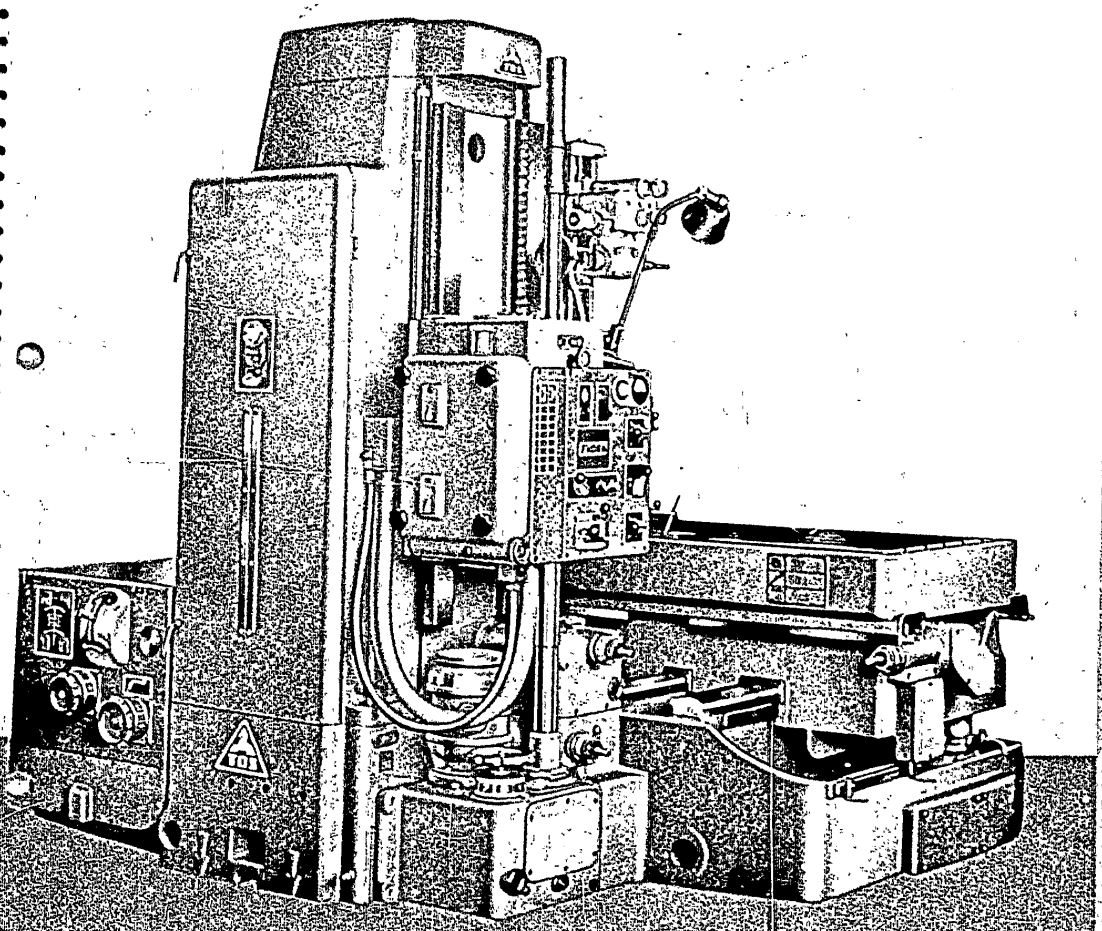

TOS AUTOMATIC DIE-SINKING MACHINE

Type

FK08 a

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The principle of copying

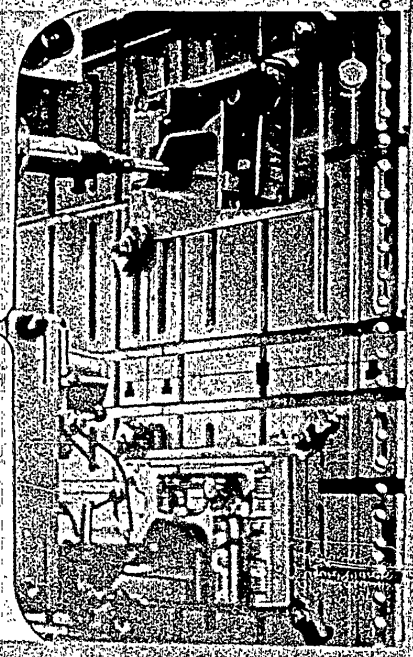
The shape of the master form being copied is duplicated by the light contact of a sensitive electric tracer. The minute impulses produced by the tracer, which can even be slightly deflected, e. g. by merely one hundredth of a millimeter (0.0004"), are suitably amplified by electric relays and engage or disengage electromagnetic clutches which then control the copying movements of the machine. At the same time the path of the tracer is precisely duplicated by the cutter in the machined object. The master form and the machined object are absolutely identical.

Accuracy

The following minimum time delay between the impulses of the tracer and the engagement and disengagement of the movements of the cross slide, table or headstock have been attained by a novel, the maker's own design of all the tracers and an improved method of connecting the electrical devices (patents pending in Czechoslovakia and abroad): practically zero for engagements, only 0.005 sec for disengagements. This rapid reaction to the impulses of the tracer as well as the efficient electromagnetic brakes of the mechanical movement of the cross slide, table and headstock and their feed mechanisms made possible the remarkable accuracy of copying which is as high as 0.025 mm (0.001"). The copying of an object which is a mirror image of the master form, by Type Fk 08b and Fk 08c. Machines is also remarkably accurate because it is done merely by reversing the feed screw of the independent tracer carriage which has its own guideways on the column. Consequently the accuracy of a machined object, which is a mirror image of the master form, depends solely on the precision of the helical angle of the tracer carriage feed screw.

Master forms to be used

Since the shape of the pattern is duplicated by the light touch of the electric tracer the master forms may be made of less strong materials such as wood, plaster of Paris, cement, artificial stone or special plastics. Most frequently the master is made of metal. One may also use a finished product for a master, or e. g. a cracked die which can quickly be replaced by a new die manufactured economically and with the same accuracy as the unserviceable die. It is also possible to produce, after manufacturing the female portion of a cutting tool, a master for the corresponding male portion by taking a cast of the cavity of the female portion and using this accurate cast as a pattern for the copying of the male portion.
For contour copying a simple template made of sheet metal or light metal may be used even for the most intricate shapes.



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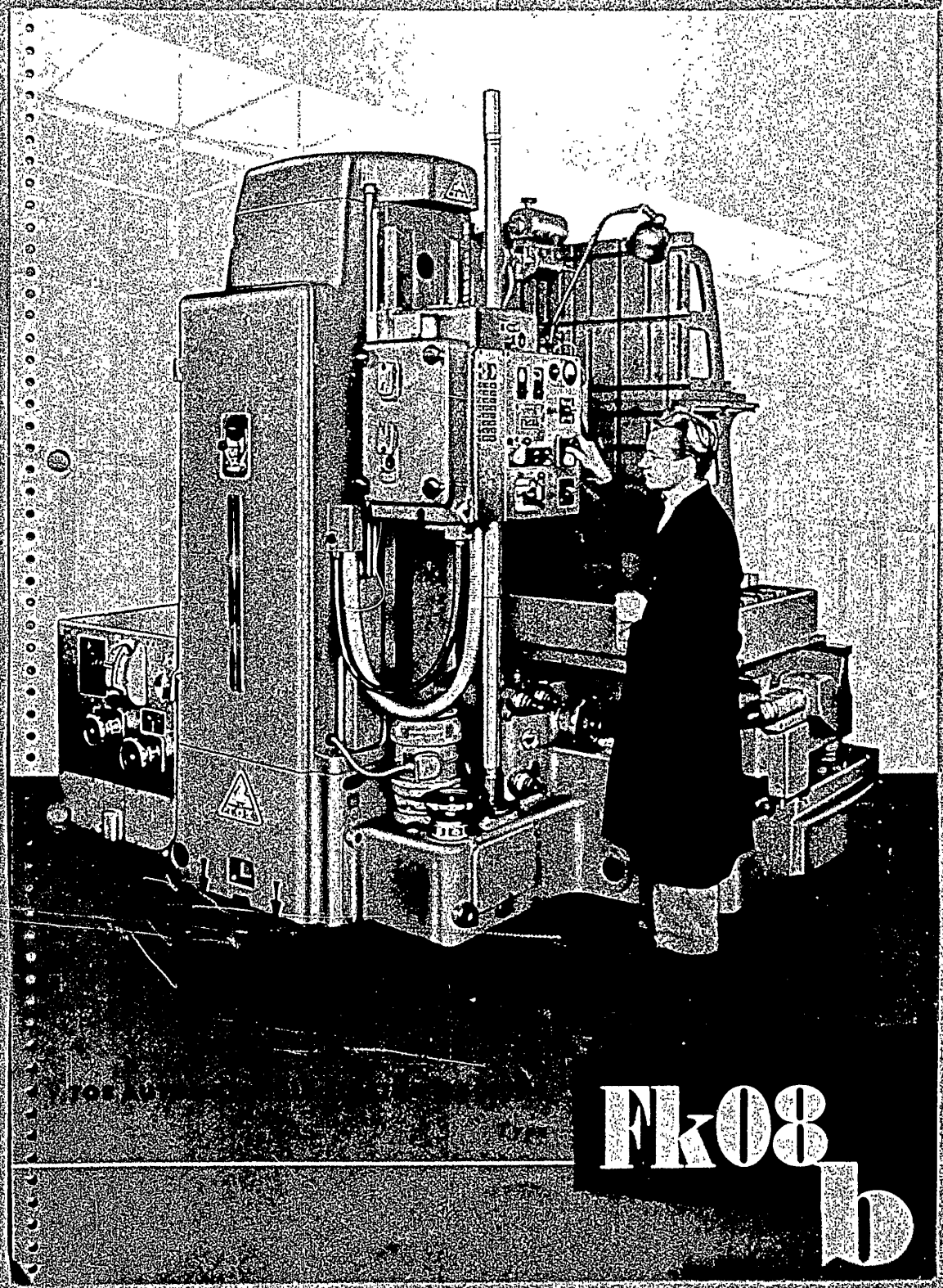

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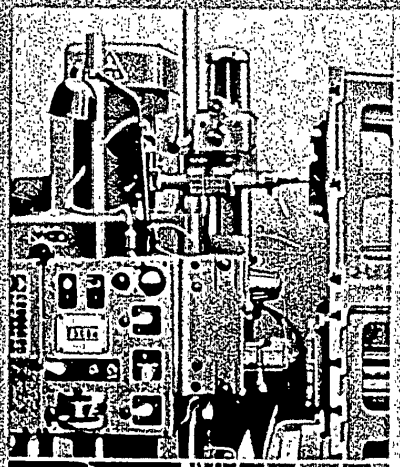
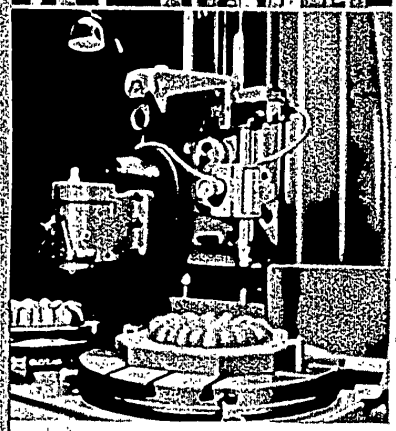
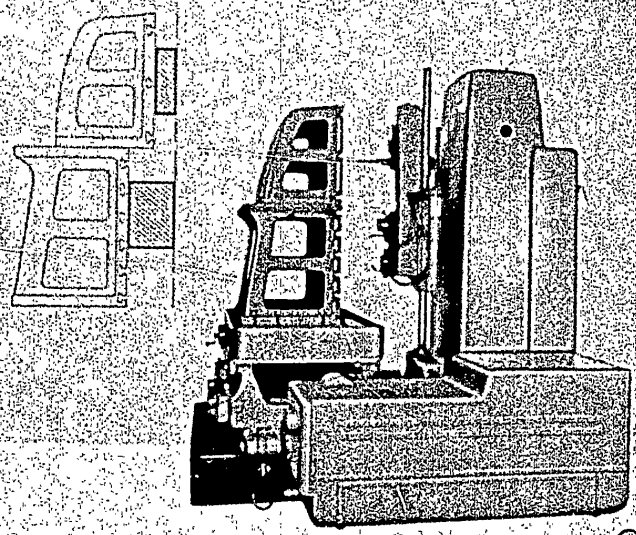


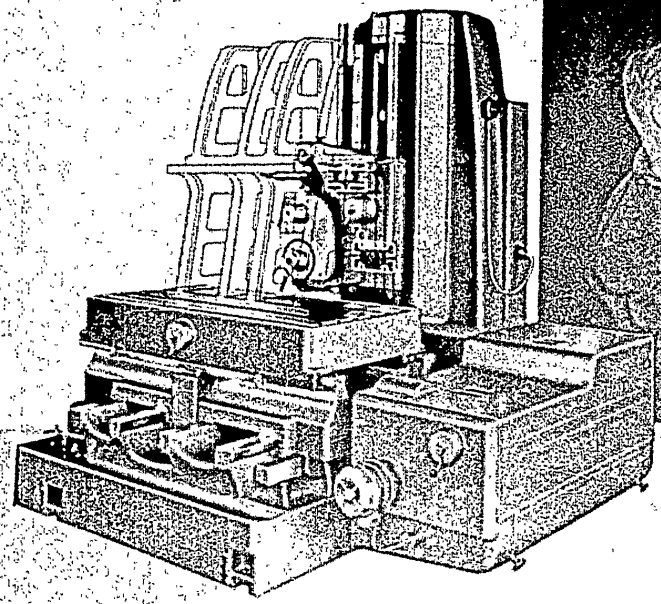


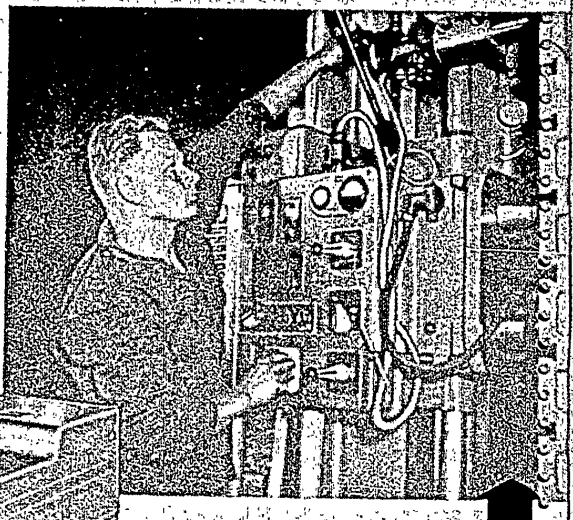


Fixing of master form and workpiece

In a great majority of cases the master is fixed to the upper part of angle plates supplied with the machine as standard equipment. The workpiece is fixed to the lower part of the fixture or directly to the table in case the object is large. For certain kinds of work the upper part of the angle plate fixture can be moved in relation to the lower part in the direction of the centre line of the cutter spindle by means of a crank applied to a square shaft extension. The purpose is to adjust possible differences in depth between the pattern and the workpiece.

On the type Fk 08c machine the pattern and workpiece are fixed for circular copying directly to the rotary tables.





For semi-automatic work with a contour tracer the operator follows the shape of the machined object and turns the lever on the rear part of the tracer.

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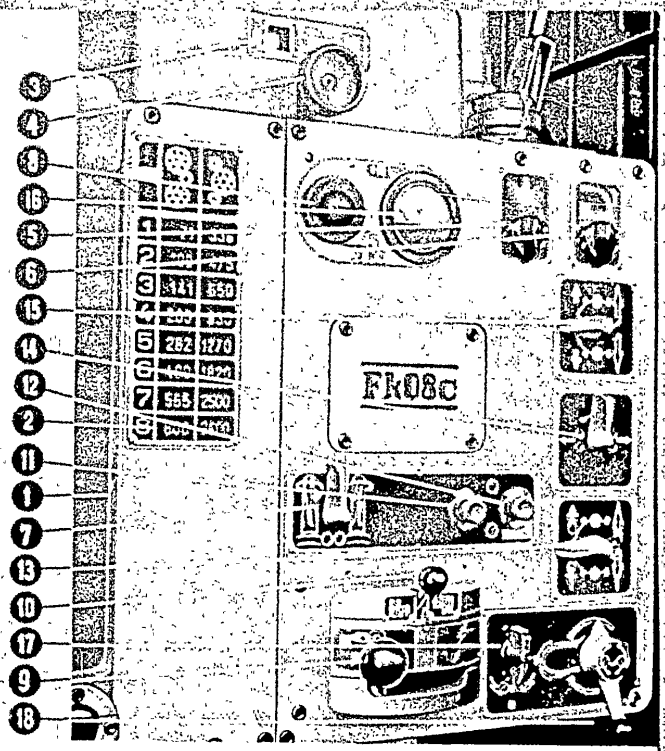
Layout of controls arranged on the spindle head of the TOS die-sinking machine type Ek 08cs

1. Change gear box of spindle head.
2. Plate with two ranges of spindle speeds.
3. Indicator of cutter diameter.
4. Handwheel for setting of torque limiting safety device.
5. Light switch.
6. Coolant pump motor switch.
7. Reversing lever of cutter.
8. Signal light.
9. Change-over switch for operation "By Hand" or "Automatic".
10. Push button lever for reversal of copying.
11. Push button for stopping the machine.
12. Push button for starting of machine.
13. Lever of change-over switch for longitudinal feed and rapid travel of table.
14. Lever of change-over switch for transverse feed of table.
15. Lever of change-over switch for vertical feed and rapid travel of spindle head.
16. Checking voltmeter for 110 Volts D.C.
17. Change-over switch.
18. Lever of change-over switch for contour copying by a finger type tracer.



Methods of Copying

Lever 9 of the main change-over switch arranged on the main control board of the spindle head has two positions: "by hand" and "automatic".

In the position marked "by hand" the cross slide, table and spindle head may be controlled by levers 14, 13 and 15 of the electric change-over switches. Levers 15 and 13 engage the feed and rapid travel of the spindle head and table, lever 14 the feed of the cross slide.

In the position marked "by hand" the cross slide, table and spindle head can also by controlled by hand cranks.

In the position marked "automatic" copying may be done on all three types of machines in coordinates by strokes, horizontally and well as vertically.

On the front wall of the main feed box of types Fk 08a, Fk 08b a lever is arranged for the selection of the kind of work as well as for the method and direction of copying in coordinates. This lever has 7 positions indicating the following methods of automatic copying of an object identical with the pattern or, in case of the type Fk 08b machine, also an object which is a mirror image of the pattern:

1. Copying by strokes, horizontally, advancing upward.
2. Copying by strokes, horizontally, advancing downward.
3. Copying by strokes, vertically, advancing to the left.
4. Copying by strokes, vertically, advancing to the right.
5. Copying horizontally without automatic movement governing pitch of strokes.
6. Copying vertically without automatic movement governing pitch of strokes.
7. Contour copying (semi-automatic).
8. Contour and depth copying (semi-automatic).
9. On the type Fk 08b machine copying can also be done of high objects with a uniform cross section from a narrow template with the tracer carriage at rest.

E. g. from a template 2 mm (5,64") thick the shape can be machined of an object up to 800 mm (32") high.

The control board of the main feed box of types Fk 08a, Fk 08b, die-sinking machines carries at its top the lever of the slide and the indicating plate for the selection of the kind of work and method and direction of the copying operation, at the bottom at the left the hand wheel for the setting of the pitch of strokes for copying in coordinates, at the right the feed changing hand wheel. The pitch of strokes is arranged in 10 steps.

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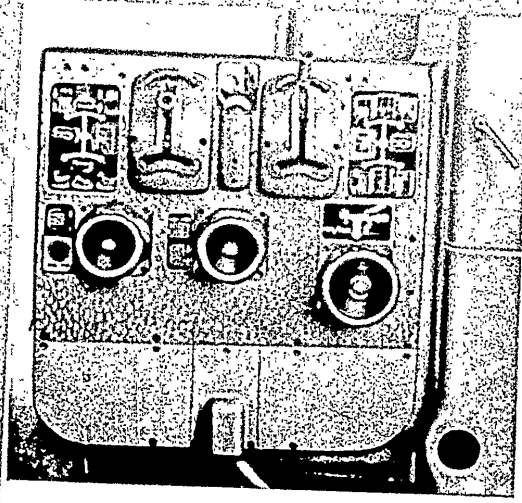


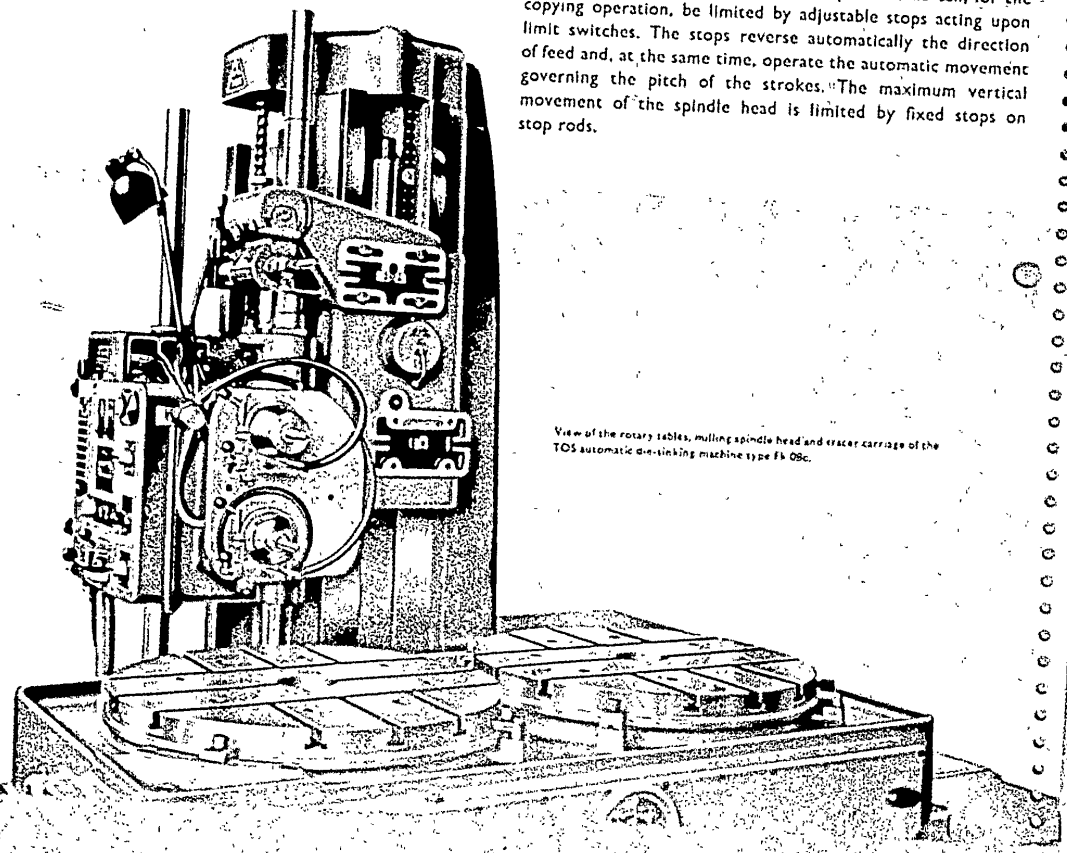
The control board of the main feed box of the type Fk 08c die-sinking machine carries, in addition, at the top on the left, the lever of the slide and the indicating plate for the selection of the kind of work and method and direction of the circular copying operation. At the bottom at the left there is the hand wheel for the setting of the pitch of the helix or spiral for circular copying. The pitch of the helix or spiral is arranged in 8 steps.

The type Fk 08c machine embodies all the above mentioned methods of operation of the type Fk 08a and Fk 08b machines but has, on the front wall of the main feed box, an additional lever the 7 positions of which control the following additional methods of automatic circular copying of an object identical with the pattern or with an object which is a mirror image of the pattern.

1. Copying in a helix advancing upward.
2. Copying in a helix advancing downward.
3. Copying in a spiral advancing outward from the centre.
4. Copying in a spiral advancing inward toward the centre.
5. Contour or partial contour copying by means of a finger-type tracer and vertical milling head.
6. Contour or partial contour copying by means of a finger-type tracer and horizontal milling spindle.
7. Circular copying by all the preceding methods with the tracer carriage at rest.
8. Circular copying by means of a cylindrical tracer and horizontal milling head, with a cylindrical cutter.
9. Circular copying by means of a double tracer including, at the same time, contour and depth copying.
10. Circular copying by segments by means of special equipment.

In addition to the above mentioned methods of automatic operation the type Fk 08c machine is also suitable for several special methods of automatic operation described in detail in the operating handbook.

The feed of the cross slide, table and spindle head can, for the copying operation, be limited by adjustable stops acting upon limit switches. The stops reverse automatically the direction of feed and, at the same time, operate the automatic movement governing the pitch of the strokes. The maximum vertical movement of the spindle head is limited by fixed stops on stop rods.



View of the rotary tables, milling spindle head and tracer carriage of the TOS automatic die-sinking machine type Fk 08c.

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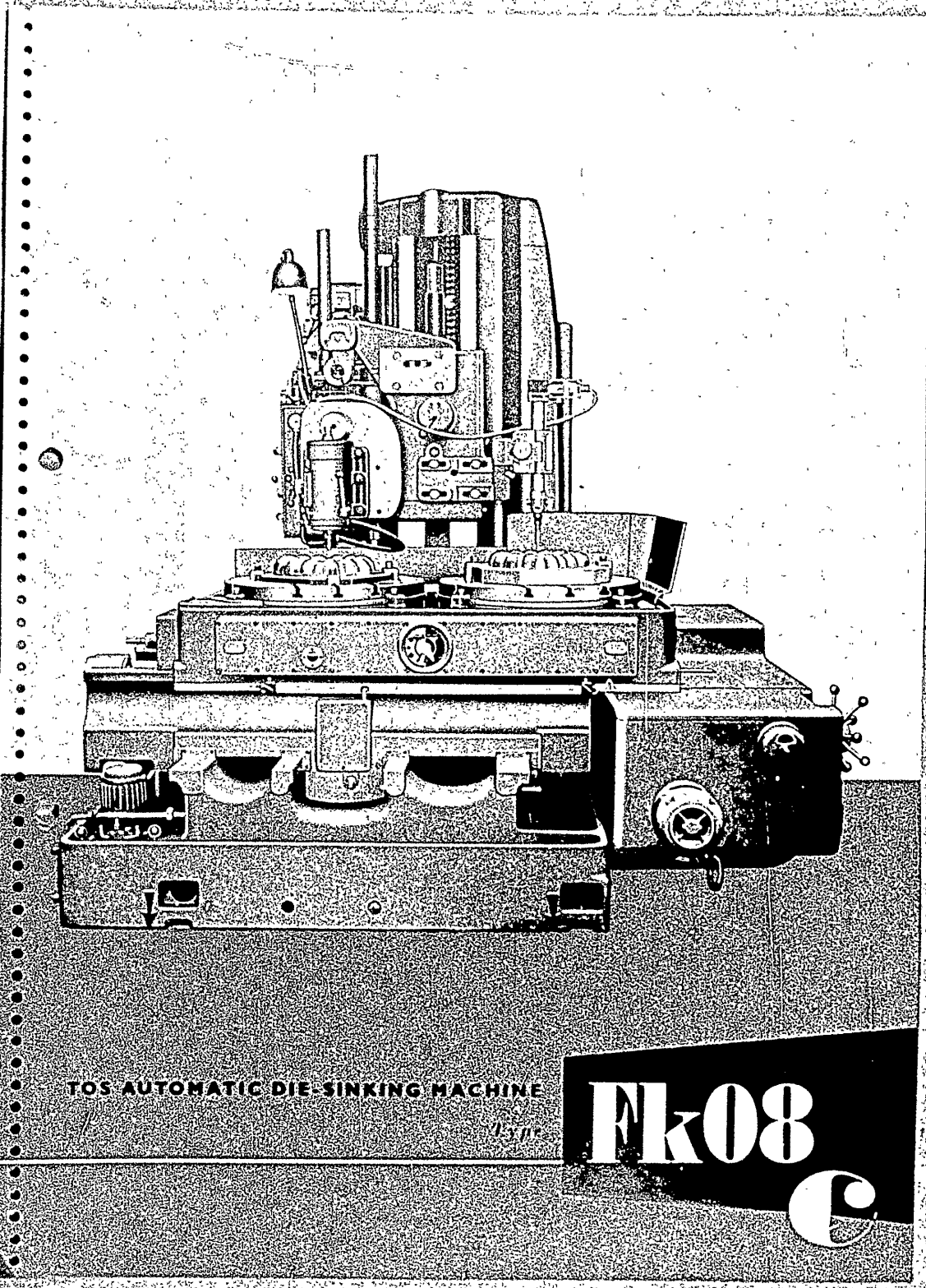

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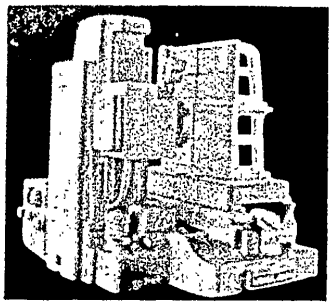
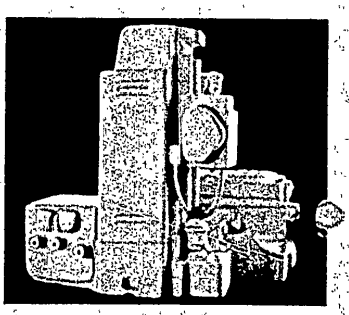
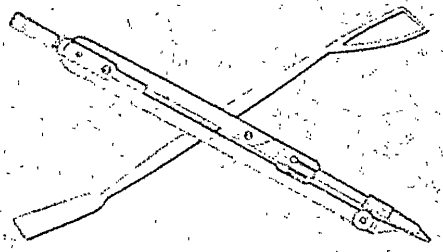
To afford easier judgement of the whole layout of the machine, its appearance and convenience of operation several small scale wooden models of the complete machine were manufactured beforehand and also two half-size plaster of Paris models of the machine and a number of full-size models of its various assemblies







Design

An outstanding feature of the whole design of the machine is its rigidity. It is leveled at three points marked on its base by arrows. This eliminates the risk that the accuracy of the machine might be upset by faulty erection. The spindle head as well as the tracer carriage are balanced by counterweights. The guideways on the stand are flat and sufficiently wide and rigid. The guiding surfaces are ground and carefully scraped.

The milling spindles run in precision anti-friction bearings, easily adjustable to eliminate play if necessary.

Ground gearing is used for important gears. The gears in the transmission gear box are noiseless helical constant mesh gears. The main bevel gears have palloid gearing. For all the gears spline shafts are used, accurately ground on special grinding machines.

All parts of the machine are made of materials specially selected for the applications concerned and carefully tested in well equipped laboratories. The big fundamental parts of the machine are made of high grade cast iron the properties of which are closely controlled The hardness of the guideways is 190 to 210 Brin Important and more highly stressed parts are made of high grade steel and are heat treated to a high degree of perfection, accurately ground and lapped wherever necessary. Any internal stresses in the materials are removed by natural as well as by artificial aging. Each part, before being fitted into the machine, is subjected to a rigorous inspection for properties of the material and precision of machining.

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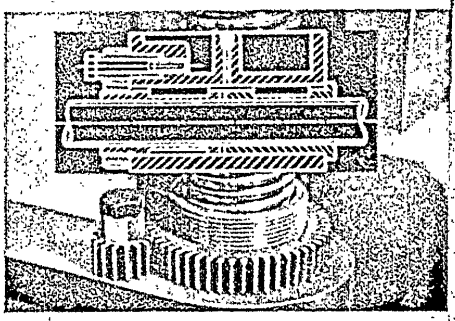
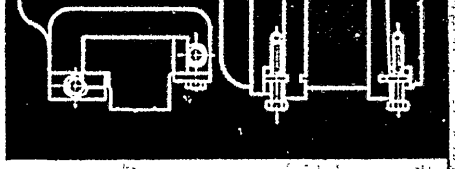
The machines are assembled with the greatest care and all their parts are fitted with the highest degree of precision. After assembly the machine is thoroughly tested for correctness of operation and working accuracy. The test for accuracy is carried out according to the standards for very accurate machine tools. The accuracy test certificate is delivered with the machine.

The controls which, in case of automatic operation of a completely adjusted machine, are only necessary for interference with the copying operation, are concentrated on the control board of the spindle head. The operation and adjustment of the machine are facilitated by clear and easily readable instruction plates.

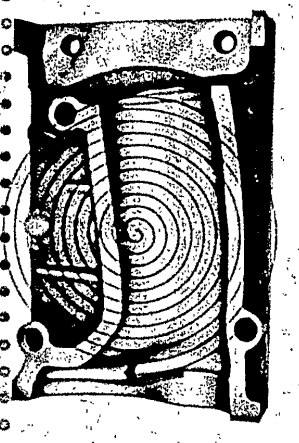


Any play which may develop in the nuts of the leadscrews can easily be taken up without any dismantling.

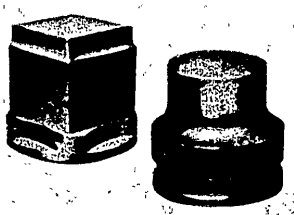


Play in the guideways of the cross slide, table and spindle head can be taken up accurately by tapered gibs.

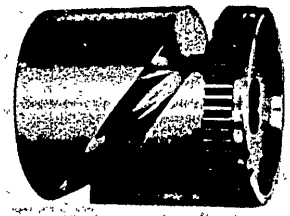
Specimens of parts milled on type Fk 08 machines



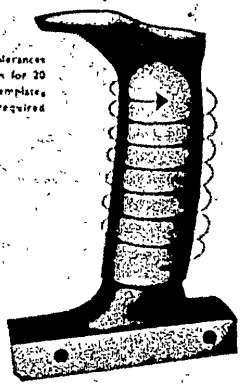
One half of a pattern for high rubber boots manufactured by circular copying in a spiral. The accuracy of the irregular curvature is ± 0,05 mm (0,002").



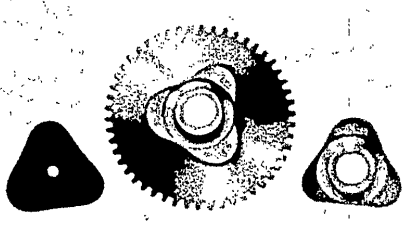
A four sided steel prism with 100 mm (4") wide sides was machined by circular copying to demonstrate the working accuracy. The parallel position of the sides, squarity of the sides and correctness of the right angles were exact with a tolerance of 0,025 to 0,03 mm (0,001" to 0,0012"). The sharpness of the corners was identical with that of the pattern. An eccentric cylinder was machined by the same method. The tolerance of its cylindricity was 0,025 to 0,03 mm (0,001" to 0,0012").



The working surface of a cam of an automatic grinding machine $32 \begin{smallmatrix}+0,05\\-0,00\end{smallmatrix}$ mm wide was milled in two stages, i. e. first the top, the bottom portion of the surface. The accuracy achieved in the ascending and descending portions was, except for the points of transition, within 32 H7 tolerances, i. e $32 \begin{smallmatrix}+0,025\text{mm}\\-0,000\text{mm}\end{smallmatrix}$



Foot for vulcanizing high rubber boots milled within tolerances specified on the drawing. Measurements were taken for 20 sections of the shin and foot. The foot fitted into the templates of the measuring jig at all measuring points with the required tolerances.



Pin and hole of irregular shape milled according to a sheet metal template. The highest error measured on the pin when inserted into the hole was 0,05 mm (0,002").

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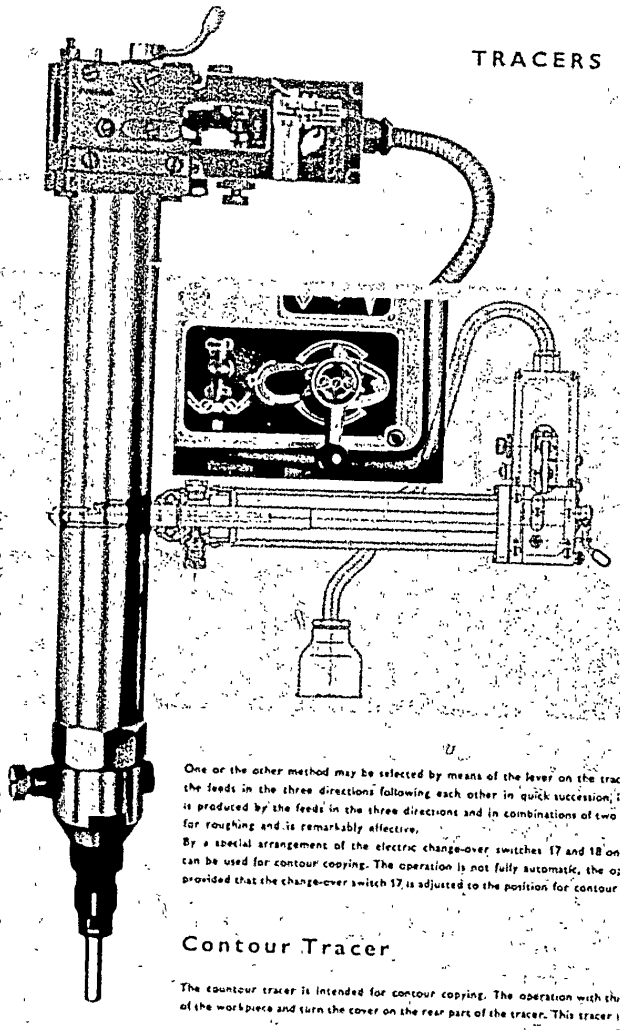
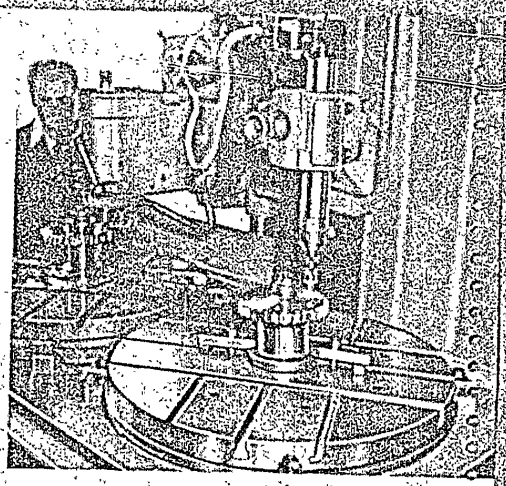
TRACERS





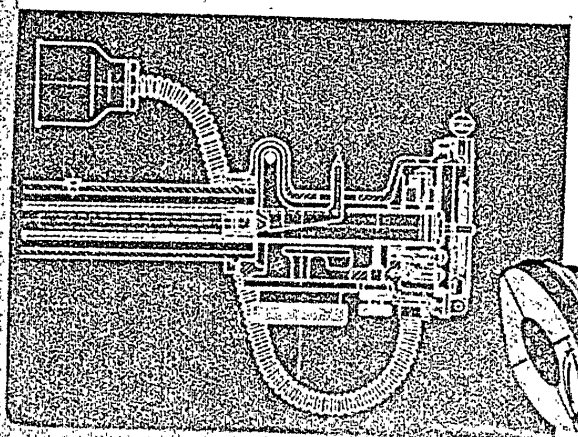
Finger type Tracer

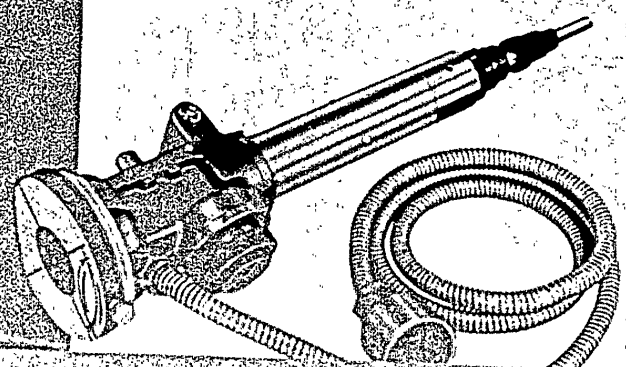
The finger type tracer is intended for fully automatic copying of irregular curved shapes. The maker's own novel design of tracer may be described as follows:
The tracer rod rests in front of a large conical surface allowing for a rolling movement, the rear end of the rod presses against the flat surface of an adjusting screw. The protruding front part of the tracer rod with the exchangeable finger is short. The tracer is more sensitive and accurate. There are two methods of operation with the finger-type tracer:
THREE POSITION copying and
FIVE POSITION copying.

One or the other method may be selected by means of the lever on the tracer box. The first method, the copying movement of which is produced by the feeds in the three directions following each other in quick succession, is intended for finishing. The other method, the copying movement of which is produced by the feeds in the three directions and in combinations of two directions at the time following each other in quick succession, is intended for roughing and is remarkably effective.
By a special arrangement of the electric change-over switches 17 and 18 on the main control board of the spindle head (page 7) the finger-type tracer can be used for contour copying. The operation is not fully automatic, the operator has to follow the shape of the workpiece and move the lever 18 provided that the change-over switch 17 is adjusted to the position for contour copying (either to the left or to the right, according to operating place).

Contour Tracer

The countour tracer is intended for contour copying. The operation with this kind of tracer is not fully automatic. The operator has to follow the shape of the workpiece and turn the cover on the rear part of the tracer. This tracer is only supplied on request as optional equipment.





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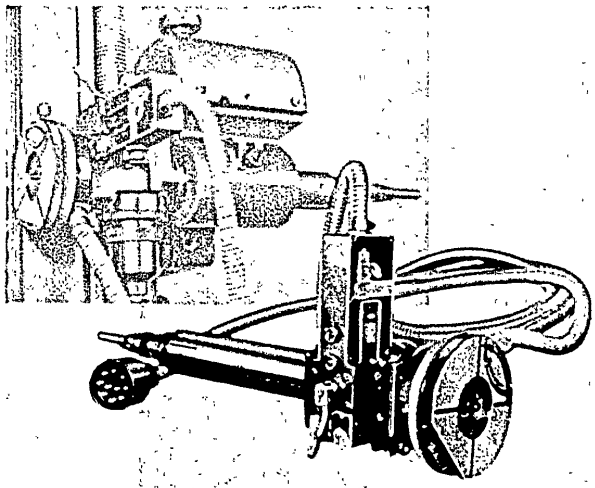
Combined Tracer

The combined tracer is intended for contour and depth copying. It can be assembled of the finger type and contour tracers. When the box of the finger type tracer is fitted onto the contour tracer this combined tracer is obtained which permits shapes to be cut with an angle of ascent or descent of not more than 35°. It is most frequently used for the milling of edges of curved surfaces.



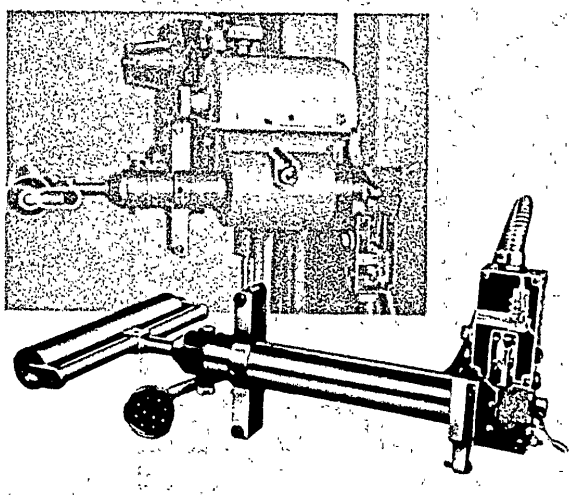
Cylindrical Tracer

A cylindrical tracer is only supplied as special equipment of the machine against extra charge. It is intended for work with a horizontal milling head and an exceptionally effective cylindrical cutter supported by bearings at both ends. The tracer has a box identical with that of the finger type tracer but a hollow rotating pick-up cylinder is used instead of the finger. The tracer rod is provided with a rolling movement and perfectly balanced.

The cylindrical tracer also permits five position and three position copying, same as the finger type tracer.

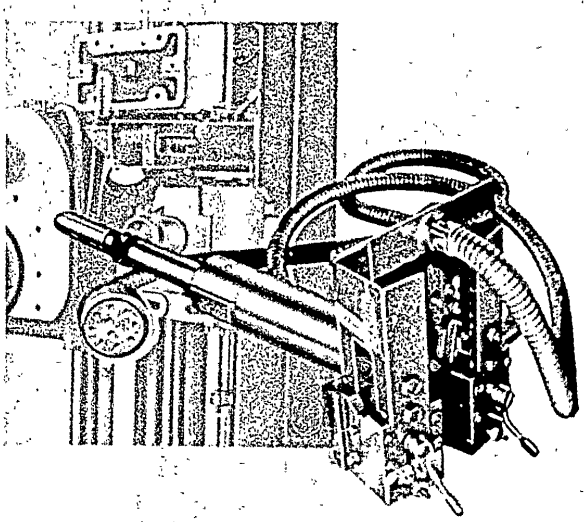
The tracer may be turned 90° for work with a horizontal milling head fitted with its centre-line in a vertical position.

One pick-up roller is supplied with the cylindrical tracer.



Double Tracer

A double tracer is supplied as special equipment against extra charge. It permits, on a type Fk 80 c machine, fully automatic simultaneous circular contour and depth copying and is the last word in the technique of copying. A double tracer is an ingenious combination of two finger type tracers. It is also suitable for five position and three position copying, same as a finger type tracer. A two part tracer finger is supplied with the double tracer.



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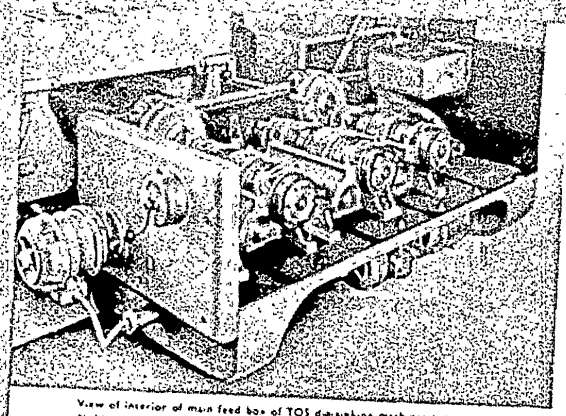
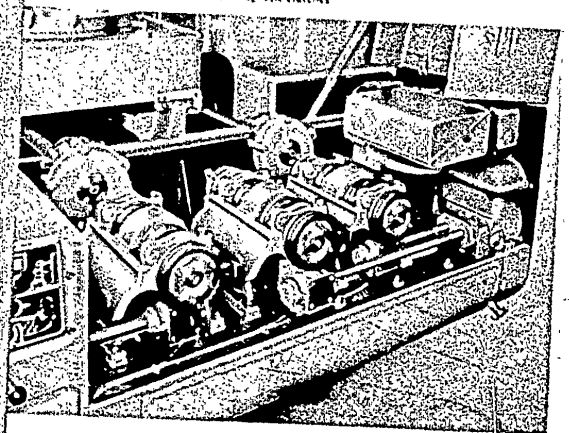


View of interior of main feed box of TOS die-sinking machines types Fk 04a—b showing electromagnetic clutches



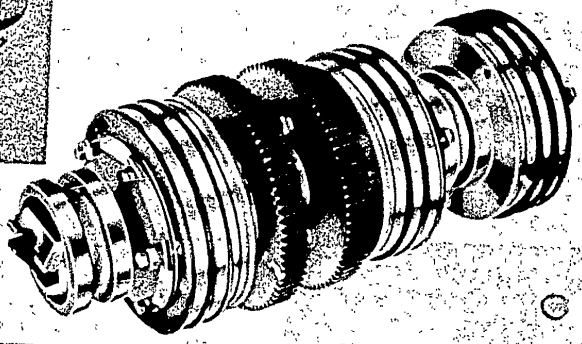
View of interior of main feed box of TOS die-sinking machines types Fk 08c showing electromagnetic clutches.

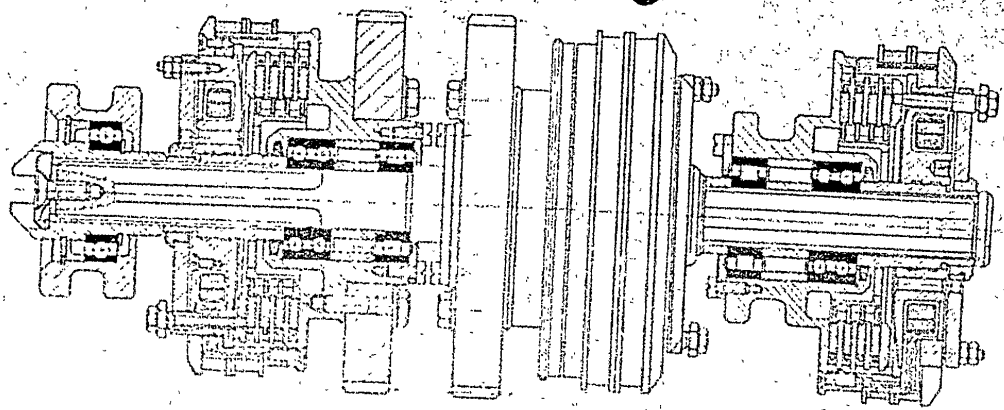
Electromagnetic clutches for feeds

The electromagnetic clutches with the corresponding drives and gears, the stroke control for copying in coordinates as well as for circular copying, the automatic equipment for the control of the rotary feed during operation and other control assemblies are arranged in a single feed box and very easily accessible.

The electromagnetic clutches for the cross slide, table and spindle head feeds are driven by an electric motor through an eight speed gear box. The machine is equipped with longitudinal and vertical rapid travel of the table and spindle head which shortens idle times and speeds up operation.

The inertia of the electric motors for the rapid travels is only coupled with the feed mechanisms of the machine during the moment the rapid travel is switched on.





Sectional view of electromagnetic clutch. Its ingenious design made possible the attainment of practically zero time lag for engagements and a time lag of 0.005 seconds for disengagements which surpasses all electromagnetic clutches known at present.

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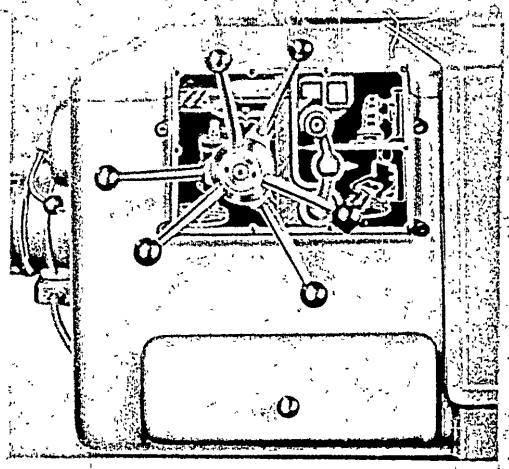
Automatic control of rate of rotary feed of rotary tables

In order to maintain the selected rate of rotary feed in the course of a circular copying operation irrespective of the distance of the machined point from the centre of the table the type Fk 08c machine is equipped with a special device for the automatic control of the rate of rotary feed during operation. There is an indicator fixed to the feed box of the machine representing by its shape the spindle head and tool. This indicator is set by means of the rear star wheel to suit the length of the tool and the projection of the spindle. The whole device is locked by means of the front star wheel. The speed of rotation of the rotary tables is then controlled during operation automatically and continuously in relation to the distance at which the tool is working from the centre of the table.

The lever of the slide for the selection of copying in coordinates or circular copying or, if applicable, any other method of copying is arranged at the right of the star wheels.



Indicator and star wheels for automatic control of rate of rotary feed of rotary tables

Torque limiting safety device

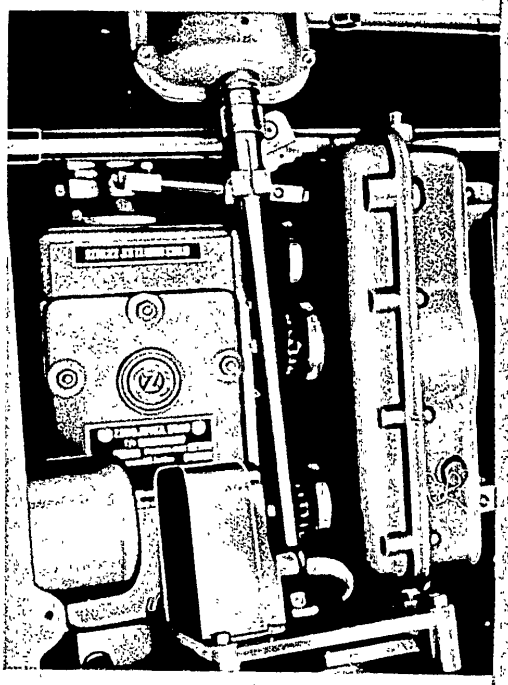
Since the allowance for the machineng of the workpiece often varies the tool might break during automatic operation at any point where the machining allowance is too great. This danger is prevented by the torque limiting safety device which, in case of overload of the cutter of any spindle, disengages all the feeds and engages them again automatically as soon as the cutter cuts itself free in the material

This device is set by means of a hand wheel according to the diameter of the cutter used. This diameter is shown by a figure in an inspection hole.

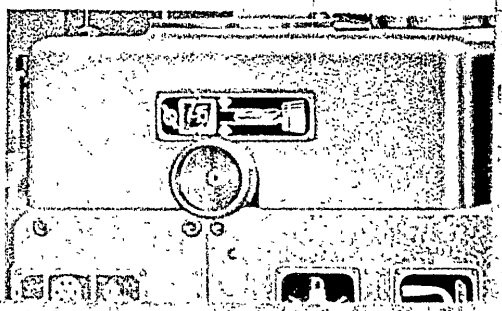
The main advantage of this device is the fact that its action depends on the torque by which the tool is stressed.

This feature makes the device superior to other safety devices depending on power. Apart from that it permits the torque of the cutter to be guarded in one spindle or in both spindles independently of each other which is as a rule, impossible when the power is being guarded.

(Patents for this device are pending.).



View of interior of main feed box showing automatic control of rate of rotary feed of rotary tables during operation.



Indicator of cutter diameter and hand wheel for setting of torque limiting safety device

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Milling cutter drive - Speeds

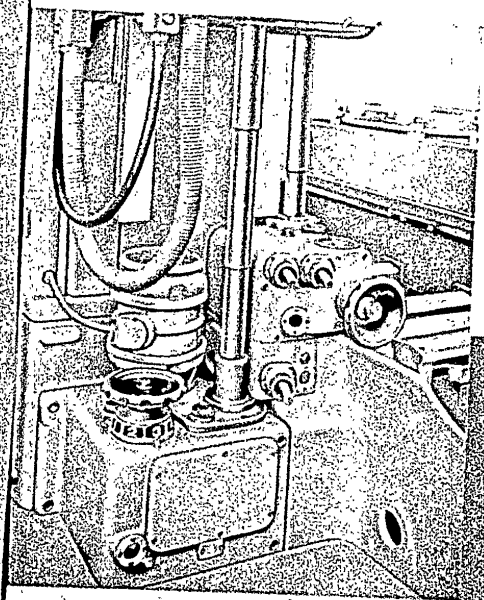
The milling spindle has 8 speeds in the standard range and 8 in the higher range. They are arranged in geometric progressions with a coefficient of 1,41.

Standard range of speeds. 70, 100, 141, 200, 283, 400, 566, 800 r. p. m.

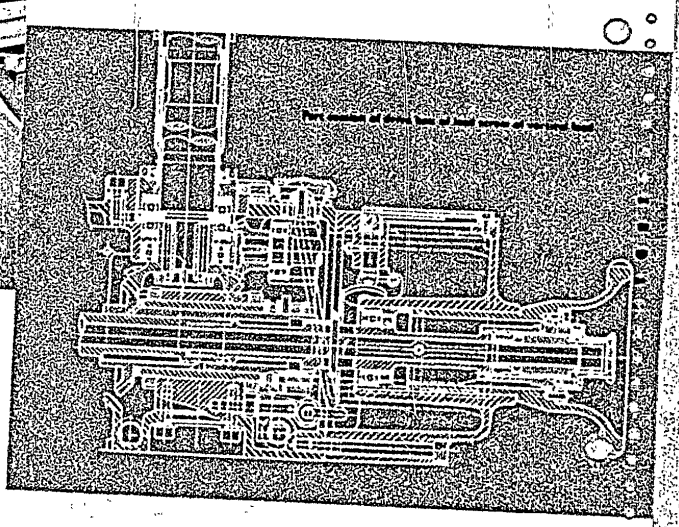
Higher range of speeds. 335, 475, 650, 930, 1270, 1820, 2500, 3600 r. p. m.

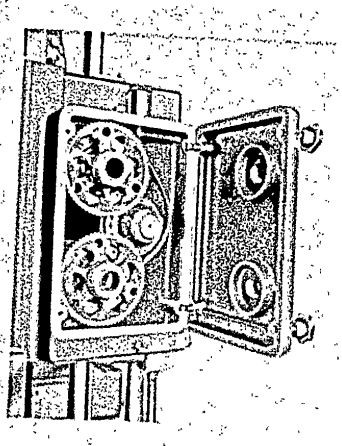
The two ranges of speeds partly overlap in a convenient way so that the steps of one range are between the steps of the other range. As a result either range may be used within the limits of the speeds most commonly used. This affords a series of fine increments of tool speeds.

The speeds of the milling spindle (or spindles) are changed by means of a hand wheel (in case of more recent machines by means of a lever) arranged directly on the eight speed gear box. In the majority of cases the machines are operated with only one milling spindle working. In such a case the other spindle may be put out of operation by removing the appropriate gear of the spindle drive.



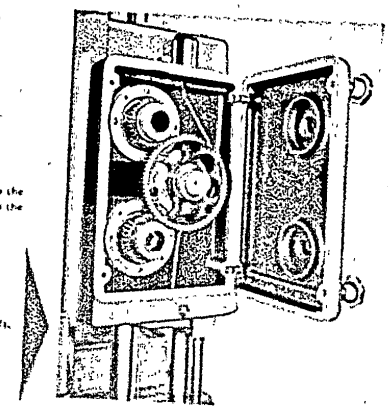
View of main gear box of milling spindle drive. Hand wheel for speed change of spindle speeds shown at left. Drive box of feed screw of vertical feed shown at right together with hand wheel for setting machine for copying of mirror image.





Setting of standard range of spindle speeds.

The standard range of speeds may be changed to the higher range by changing two gears in the box on the box on the milling spindle head.



Setting of higher range of spindle speeds.

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Electrical equipment

The ingenious, yet simple electrical equipment of the machines has made possible the most accurate method of copying known at present, controlled by an electric tracer and electromagnetic clutches. High speed relays of special design receive impulses from the tracer control electromagnetic clutches by direct current through accelerating condensers and reducing resistors. The electromagnetic clutches engage and disengage the cross slide, table and spindle head feeds. Patents are pending in Czechoslovakia and abroad for the tracer, high speed relay and electromagnetic clutch.

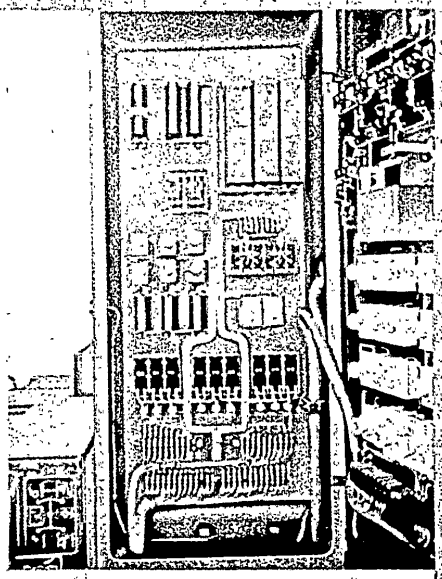
The terminal board for the incoming line is arranged on the electromagnetic clutch box. The main switch is on the door of the electrical instruments box. When it is on a light burns above the switch and another one on the control board of the spindle head on which practically all the other controls of the electrical equipment are concentrated.

The machine has a total of six electric motors, normally squirrel cage ones, 380/220 Volts, 3 phase, 50 cycles. The electromagnetic clutches and auxiliary equipment are controlled by direct current supplied by a 110 V d. c. dynamo which forms part of a set fitted in the stand of the machine.

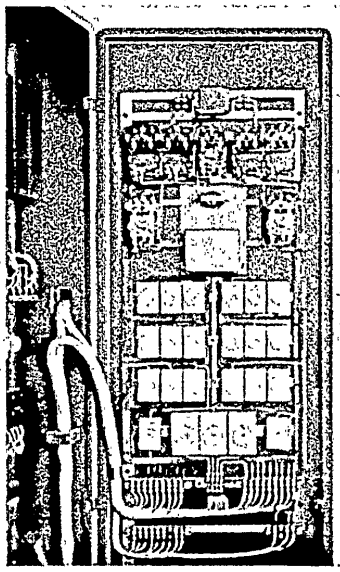
Hand interference with the copying operation is made possible by a portable push button box suspended on the stand.

The independent lighting system of the machine is designed for 24 Volts transformed directly from the power supply by a transformer arranged in the electrical instruments box.

The whole electrical equipment built to the standard specifications applicable is built into the stand, yet it is easily accessible. So there is no separate cabinet for the Fk 08 machine, set up apart from the machine which, as a rule, occupies a considerable amount of space.



View of inside of electrical instruments box; "a. c." part of instruments on cover of box.



View of inside of electrical instruments box; "d. c." part of instruments is inside box in stand.

Standard electrical equipment

1 electric motor for drive of milling spindles 1420 r. p. m., 3 kW
1 electric motor for feed box, 920 r. p. m., 0.75 kW.
2 electric motors for rapid travel, 1420 r. p. m., 1.1 kW each.
1 electric motor for coolant pump, 2800 r. p. m., 0.28 kW.
1 d. c. generating set consisting of 1 electric motor, 1390 r. p. m., 0.75 kW and 1 dynamo, 1390 r. p. m., 0.5 kW, 110 V d. c.
3 built-in two part electromagnetic clutches with electromagnetic brakes.
Complete wiring and instruments of the machine including relays, contactors, fuses, resistors, condensers, hand switches, push buttons, limit switches, pilot bulbs and a voltmeter.
Independent lighting system of the machine, 24 Volts including the necessary built-in transformer and bulb.
The complete electrical equipment, particularly the electric motors, is supplied for 380/220 Volts, 50 c/s, 3 phase.
The machine can only be supplied for a different electrical system on the basis of a special request.

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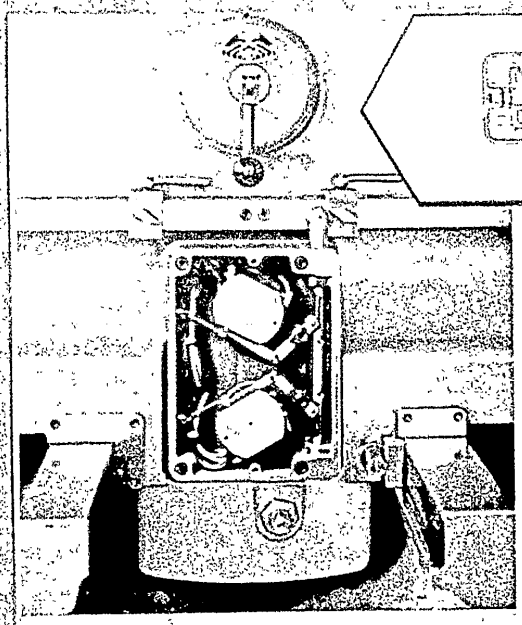


View of inside of instantaneous change-over switches on cross slide.

Lubrication

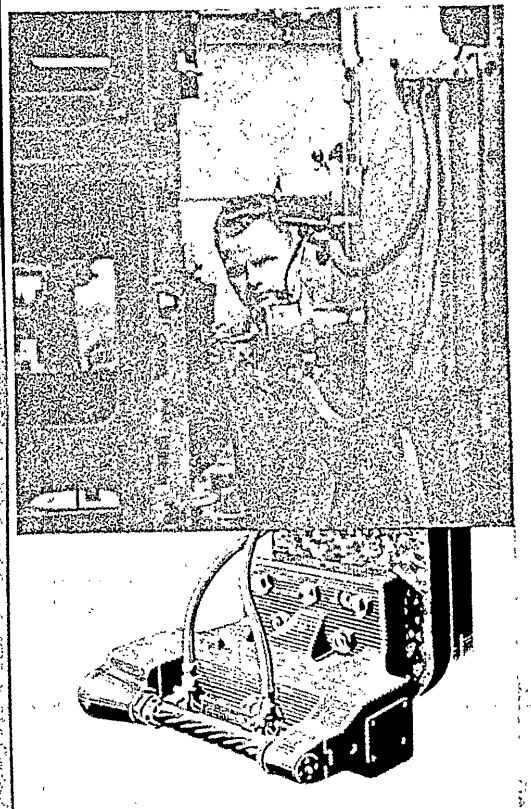
The most important gears, main gear box of the milling spindle drive and guiding surfaces of the spindle head are lubricated by oil pumps driven of the machine. Their operation can be checked by inspection windows. The oil level is indicated by conveniently arranged oil level gauges. Practically all the other gears run in an oil bath.

The main feed box, table (in case of the type Fk 08c machine also the rotary tables), cross slide and the corresponding lead screws and nuts are centrally lubricated by pressure lubricators. These lubricators are piston pumps with a relatively large diameter of piston. When the handle is turned the piston presses the oil through the distributing cone to each lubricating point, always under full pressure.

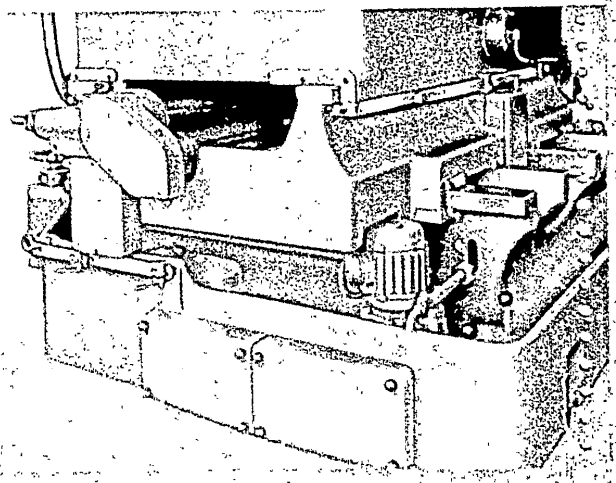
Cooling

A high capacity electrically driven centrifugal pump supplies coolant - kerosene - to the points of machining through a pipe with two nozzles and cocks.

The horizontal milling head (special equipment of the type Fk 08c machine) has its own part of the coolant piping and nozzles adjustable on and fixed to a guiding rod.



Part view of cross slide, hand drive of lead screw of longitudinal feed table, stops of longitudinal and cross feed and coolant pump of type Fk 08b die-sinking machine



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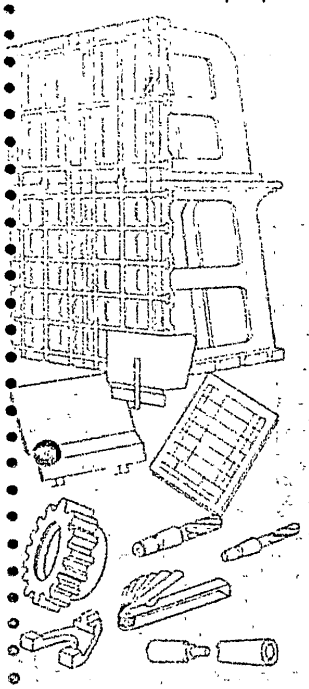
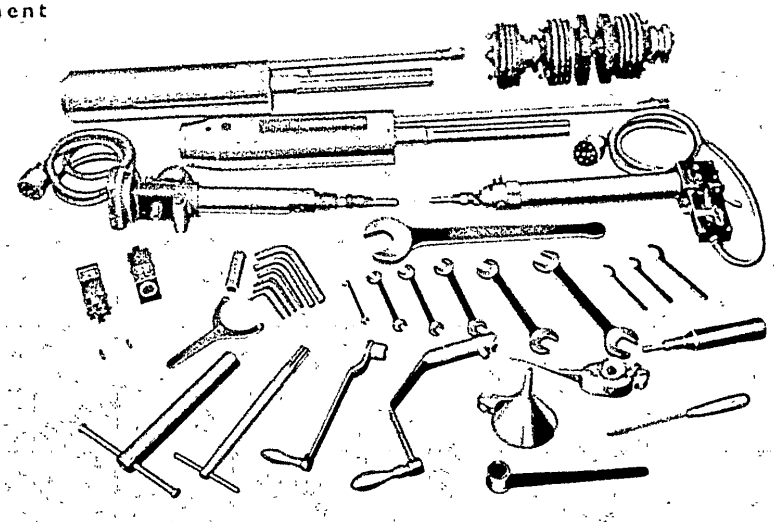
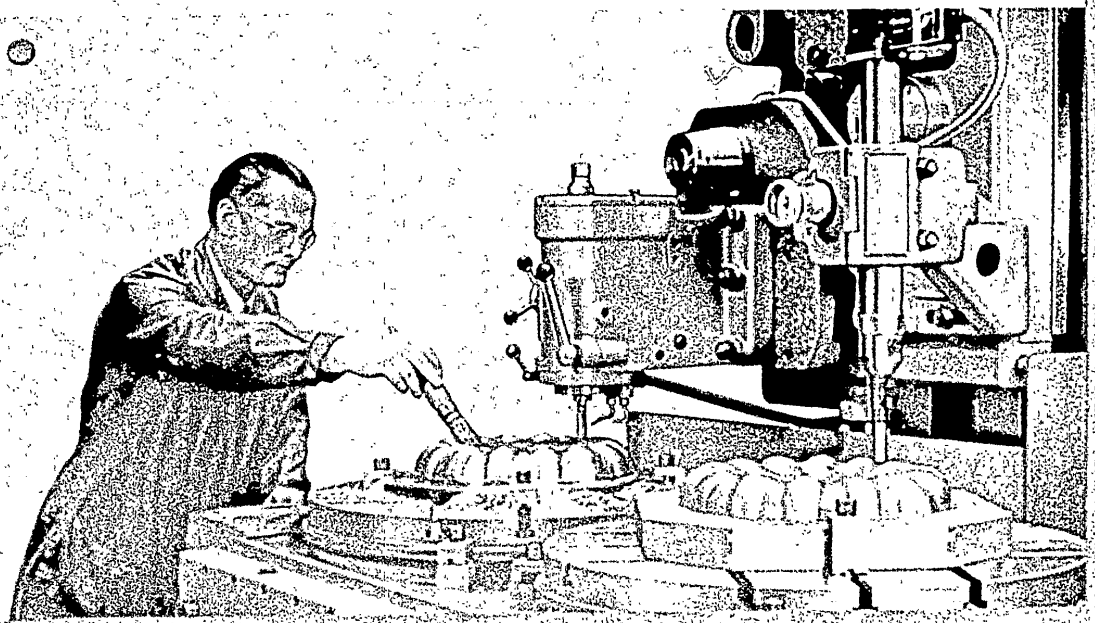
Standard equipment





The price of the machine includes the following standard equipment supplied without special order.

2 two-part angle plate fixtures with one crank for fixing pattern and workpiece - 1 cylindrical supporting sleeve of milling spindle with plug in spindle taper - 1 tapered supporting sleeve of milling spindle with plug in spindle taper - 1 change wheel for changing range of spindle speeds - 1 finger type tracer - 2 tracer fingers - 2 spare high speed relays - 1 complete spare electromagnetic clutch - 6 spare lead-in carbons for the electromagnetic clutches - fan-type feeler gauges for measuring gaps between tracer contacts - 5 coolant splash guards - 5 reducing sleeves with reduction pieces of clamping screws - 2 milling cutters - 2 milling mandrel and cutter fixing screws - hand crank - set of standard and various special spanners - 1 screw driver - 1 grease gun for grease and heavy oil - 1 oil can - 1 sheet metal funnel - 1 precision test certificate - 1 instruction book for the machine.



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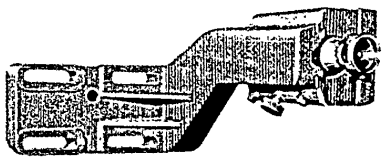
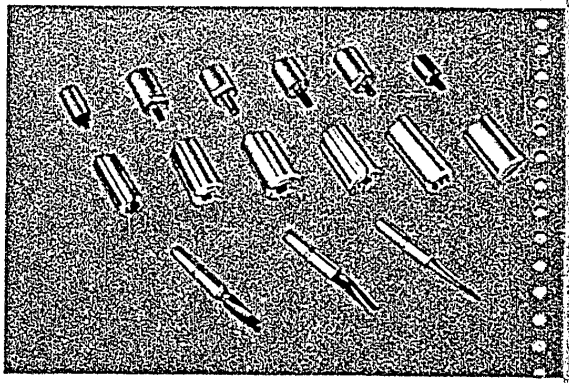


Carrier for vertical position of tracer and tool cage.



Reducing sleeves with reduction pieces of clamping screws and cutter heads

Special equipment

To special order against extra charge the following optional equipment will be supplied

Carrier for vertical position of tracer (for type Fk 08c machine only)

Contour tracer.

Cylindrical tracer for type Fk 08c machine only, for work with horizontal milling head 1 pick-up roller supplied with tracer

Double tracer for type Fk 08c only for circular copying Permits fully automatic simultaneous contour and depth copying Supplied with one two-part tracer finger

Tracer fingers To suit shapes of cutters with appropriate allowances for roughing or finishing

Horizontal milling head for type Fk 08c machine only for work with high capacity cylindrical cutter supported at both ends and cylindrical tracer Supplied with one cylindrical cutter

Vertical milling head.

Four-spindle milling head.

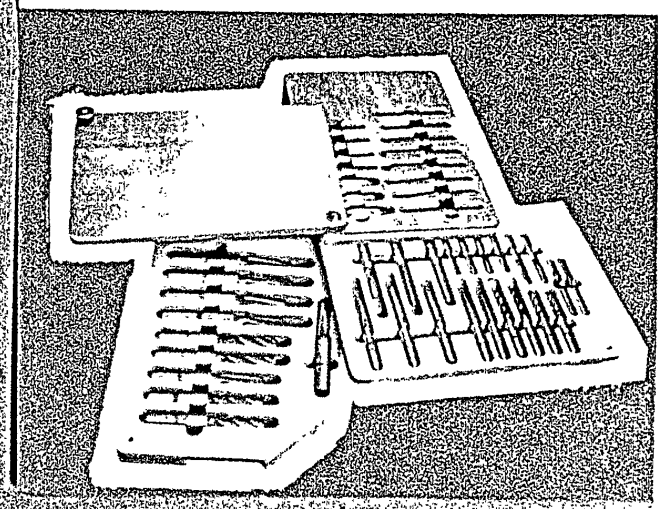
Equipment for copying by segments permits working on a type Fk 08c machine from a pattern which is merely a segment of a rotary shape

Reducing sleeves

Cutters Cylindrical end cutters, cylindrical end cutters with rounded-off corners cylindrical end cutters with radius tapered end cutters with radius, etc

Cabinet for hand tools and cutters.

Tool cage



Cabinet for hand tools and cutters

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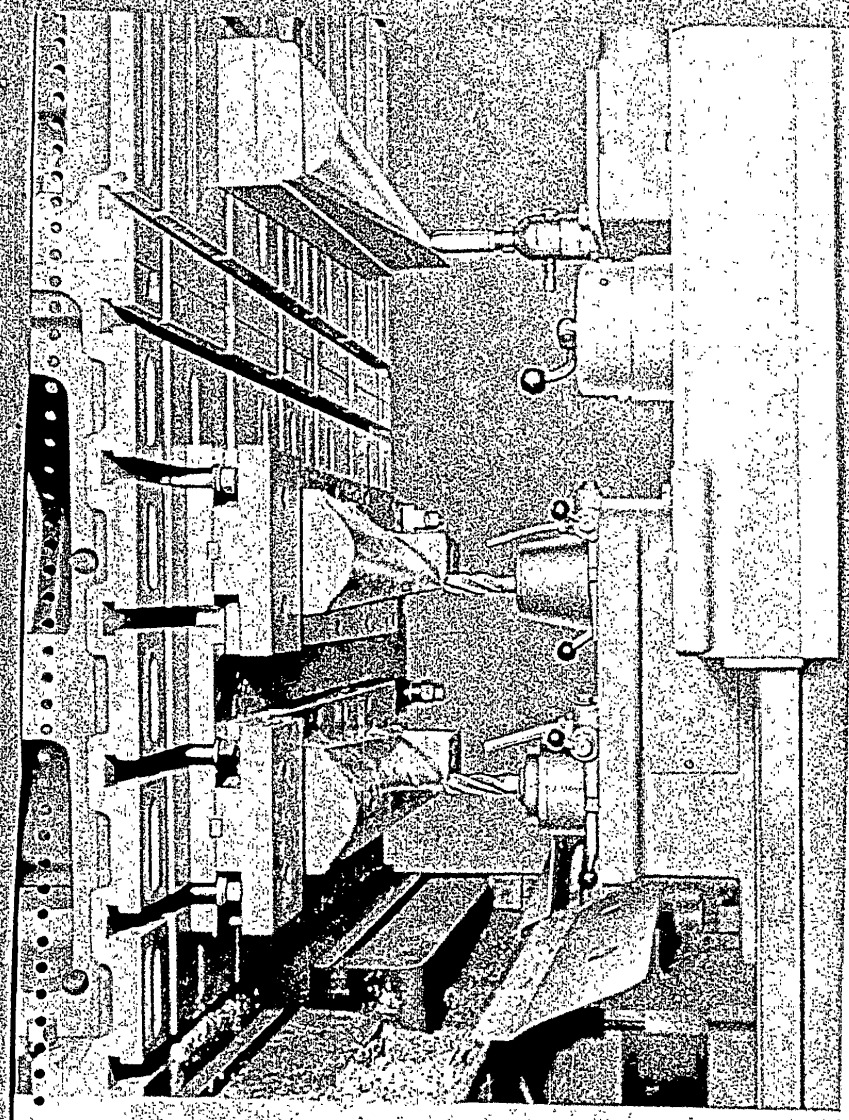

Copying with end mill.

Important

Kindly state in your order:

1. The system of the power supply and the rated voltage.
2. The tapers in the milling spindles of the machine.
3. The taper in the spindle of the vertical milling head (when ordered).

It is recommended to order the special equipment together with the machine. In case of a later order the supply of the special equipment together with the machine cannot be guaranteed.

Our machines are constantly being improved upon. The description, illustrations and data can therefore not always agree with the latest design of the machines. Already while this catalogue was printed a change in the main control board of the headstock has occured, to be seen on page 12, while in the other illustrations the old design of the main control board is shown.

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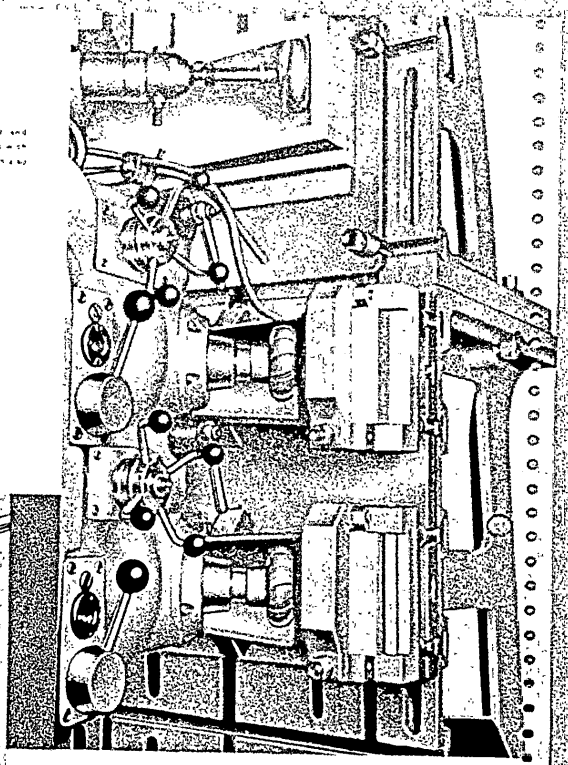
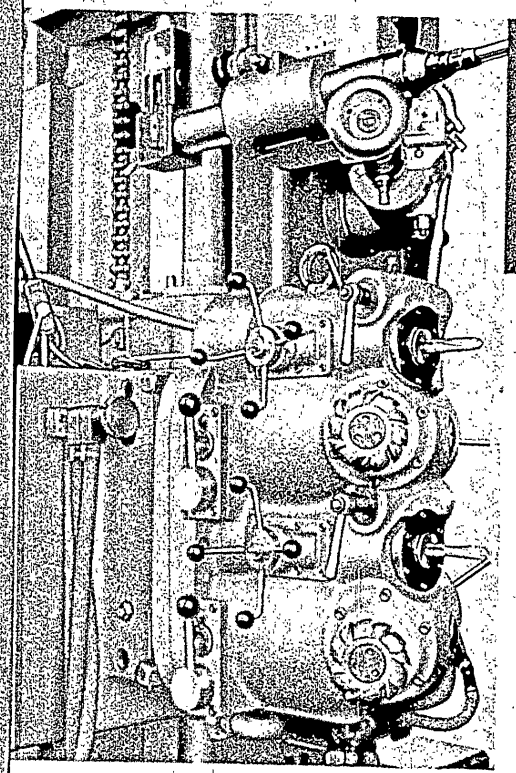
The four spindle milling head serves for economical work on the Fk 08b and Fk 08c dovetailing machines. For this kind of operation side milling cutters with spiral teeth can be used to increase the output of the machine. End mills can also be clamped in this milling head.



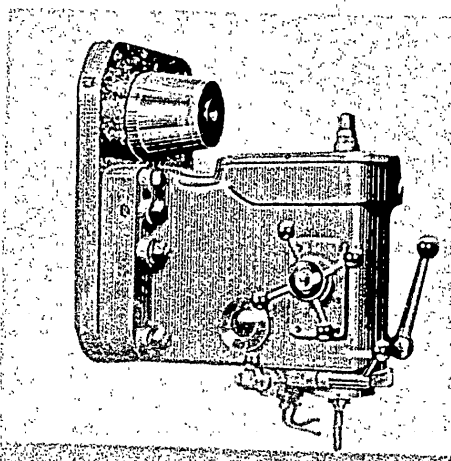


The vertical milling head forms indispensable supplement of type Fk 08c machine for complete automatic contour and circular copying. One clamping screw is supplied with head.

Reducing sleeves (supplied in two styles):

a) for tapers of milling spindles with No. 5 Morse, No. 3 Morse, Metric 40 or Metric 24 outer tapers and inner tapers as required, with reduction pieces of clamping screws,

b) for tapers of vertical milling head with No. 4 Morse or Metric 32 outer tapers and inner tapers as required, with reduction pieces of clamping screws (for type Fk 08c machine).



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SPECIFICATION:

MAIN DATA

Working surface of table			
Number, width and distance of T-slots of table	mm	1450 x 700	57" x 27½"
Height of working surface of table above floor	mm	5 x 18 x 130	5 x 23 32" x 5⅛"
Clamping surface of two two-part angle plate fixtures	mm	950	37½"
Movement of top part of angle plate fixture in direction of centre-line of cutter	mm	1140 x 1325	44⅞" x 52⅛"
Automatic longitudinal travel of table	mm	350	13¾"
Automatic transverse travel of slide toward cutter-away from cutter	mm	1000	39⅜"
Sliding movement of bearing sleeve of milling spindle	mm	400	15¾"
Automatic vertical travel of spindle head	mm	200	7⅞"
Highest position of upper milling cutter above table	mm	800	31½"
Highest position of lower milling cutter above table	mm	1025	40⅜"
Minimum/maximum distance end of milling spindle to clamping surface of angle plate fixtures with spindle bearing sleeve retracted	mm	775	30½"
Maximum vertical distance tracer to lower milling cutter	mm	0/700	0/27½"
Maximum vertical distance tracer to upper milling cutter	mm	750	29½"
Maximum surface of machined workpiece	mm	160	6⅜"
Maximum weight of machined workpiece	m²	0.8	8.6 sq. ft.
	approx. kg	2500	5500 lbs

MILLING SPINDLES:

Taper in standard milling spindle, as required	No.	3 Morse or Metric 24	
Taper in strengthened milling spindle, as required	No.	5 Morse or Metric 40	
Diameter of bearing sleeves of milling spindles	mm	120	4¾"
Number of spindle speeds in each range, in either direction of rotation		8	
Standard range of spindle speeds	r. p. m.	70 to 800	
Higher range of spindle speeds	r. p. m.	335 to 3600	

FEEDS

Number of rates of feed		8	
Rates of longitudinal feed and vertical feed of spindle head per minute	mm	20 to 225	25/32" to 8⅞"
Rates of transverse feed of slide per minute	mm	13.5 to 150	17/32" to 5⅞"
Longitudinal rapid travel of table and vertical rapid travel of spindle head per minute	mm	1500	59"
Pitch of automatic strokes, horizontal or vertical: number		10	
range	mm	0.25 to 15	0.01" to 19/32"

DRIVE:

Electric motor of milling spindle drive, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	3
El. motor of feed box 380/220 V., 50 cycl., 920 r. p. m.	kW	0.75
Two electric motors for rapid travels, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	1.1
El. motor of coolant pump, 380/220 V., 50 c., 2800 r. p. m.	kW	0.28
D. C. Mot. Gen. Set: Dynamo 110 V., 1390 r. p. m.	kW	0.5
Electric motor 380/220 V., 50 cycles, 1390 r. p. m.	kW	0.75
Total input	approx. kW	7

DIMENSIONS AND WEIGHTS:

Floor space of machine	mm	2330 x 2530	93" x 100"
Working area required	mm	2330 x 2820	92" x 111"
Height of machine	mm	2500	98"
Maximum height of machine (working)	mm	3010	119"
Net weight of machine with standard equipment, electric motors and electrical equipment	approx. kg	8200	18,100 lbs
Weight of el. motor of milling spindle drive (3 kW)	approx. kg	54	119 lbs
Weight of electric motor of feed box (0.75 kW)	approx. kg	24	53 lbs
Weight of both el. mot. for rapid trav. (1.1 kW each)	approx. kg	46	101 lbs
Weight of el. motor of coolant pump (0.28 kW)	approx. kg	6	13 lbs
Weight of el. mot. of mot. gener. set (0.75 kW)	approx. kg	22	49 lbs
Weight of dynamo (110 Volts, 0.5 kW)	approx. kg	30	66 lbs
Weight of all other electrical equipment	approx. kg	172	379 lbs
Weight of railway packing	approx. kg	700	1540 lbs
Weight of seaworthy packing	approx. kg	1000	2200 lbs
Dimensions of seaworthy packing	approx. metres	2.7 x 2.5 x 2.75	106" x 98" x 109"
Volume of railway packing	approx. cu. metres	16.3	576 cu. ft.
Volume of seaworthy packing	approx. cu. metres	17.85	630 cu. ft.

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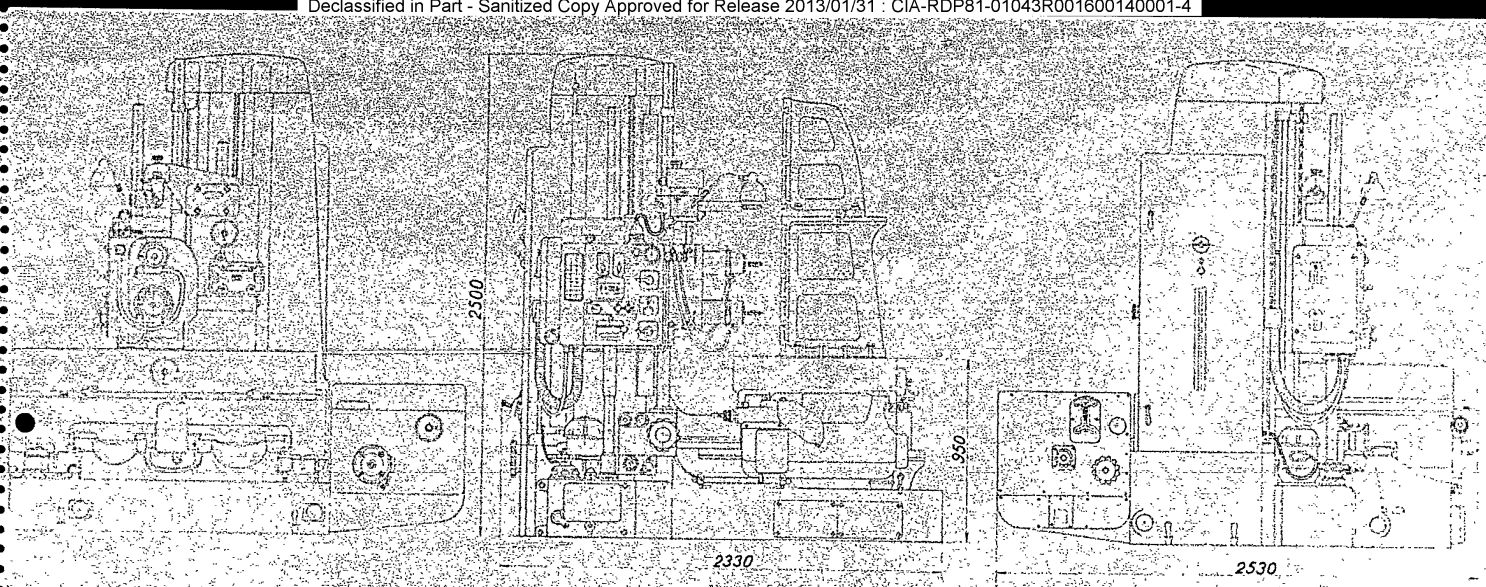

STANDARD EQUIPMENT

The price of the machine includes the following standard equipment supplied without special order:
2 two-jaws angle plate fixtures with one crank for fixing pantons and work piece - 1 cylindrical supporting sleeve of milling spindle with plug in spindle taper - 1 tapered supporting sleeve of milling spindle with plug in spindle taper - 1 spare wheel for changing ranges of spindle speeds - 1 finger-type tracer - 2 tracer fingers - 2 spare belt speed rollers - 1 complete spare electromagnetic clutch - 4 spare lead-in carbons for the electromagnetic clutches - 2 fan-type feeler gauges for measuring gaps between tracer contacts - 5 coolant splash guards - 5 reducing sleeves with reduction pieces of clamping screws - 2 milling cutters - 2 milling mandrel and cutter fixing screws - hand crank - set of standard and various special spanners - 1 screw driver - 1 grease gun for grease and heavy oil - 1 oil can - 1 sheet metal funnel - 1 precision test certificate - 1 instruction book for the machine.

SPECIAL EQUIPMENT

Supplied only to special order asking extra charge:
Tracer fingers to suit shapes of cutters with appropriate allowances for roughing or finishing.
Contour tracer.
Reducing sleeves for noses of milling spindles with No. 1 Morse, No. 2 Morse, Metric 40 or Metric 24 outer tapers and inner tapers as required, with reduction pieces of clamping screws.
Cutters: Cylindrical end cutters, cylindrical end cutters with rounded-off corners, cylindrical end cutters with radius tapered and cutters with radius, etc.
Cabinet for hand tools and cutters.

IMPORTANT!

Kindly state in your order:

1. The current of the power supply and the rated voltage.
2. The speeds of the milling spindles of the machine.

It is recommended to order the special equipment together with the machine in case of a later order the supply of the special equipment together with the machine cannot be guaranteed.

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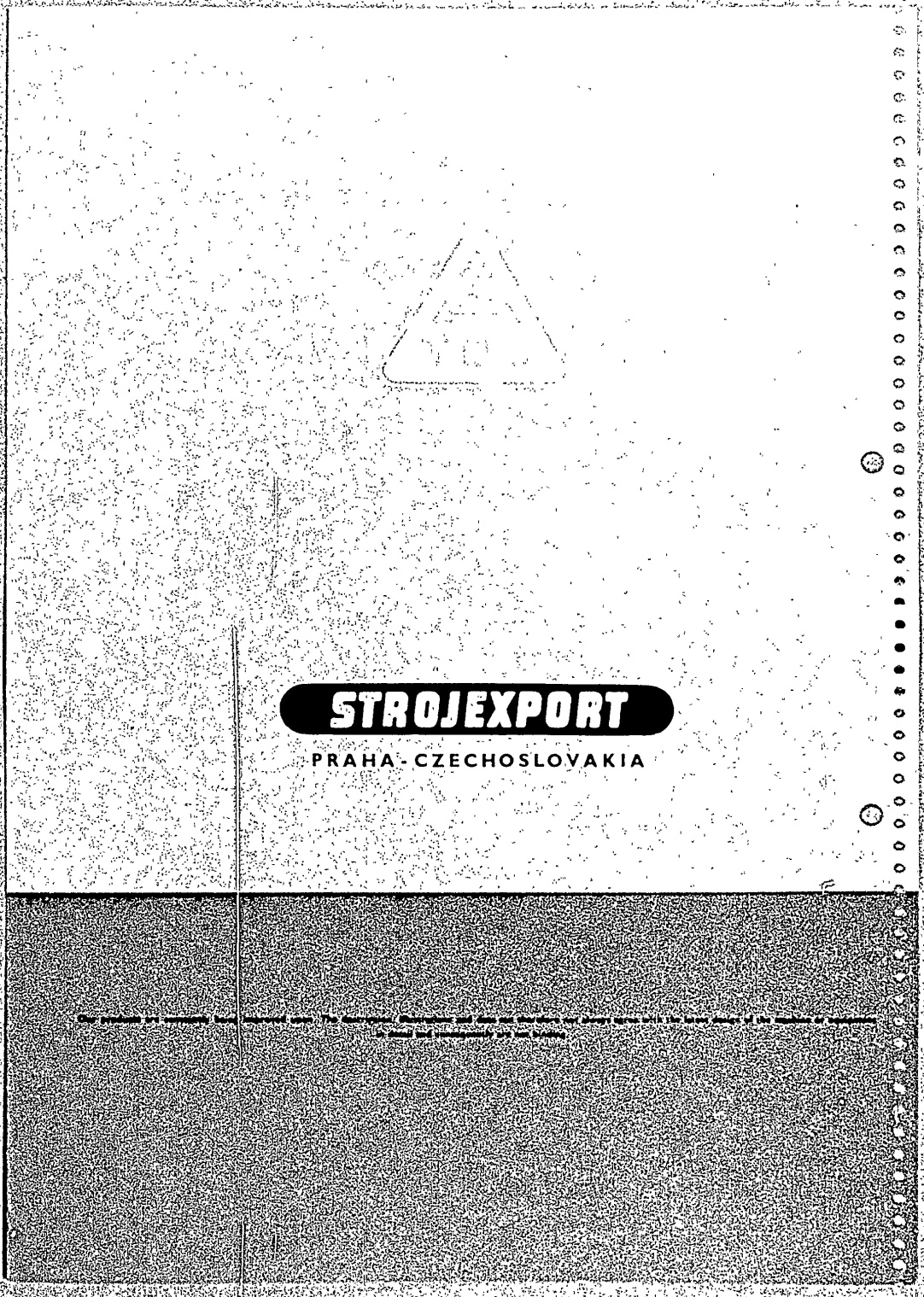

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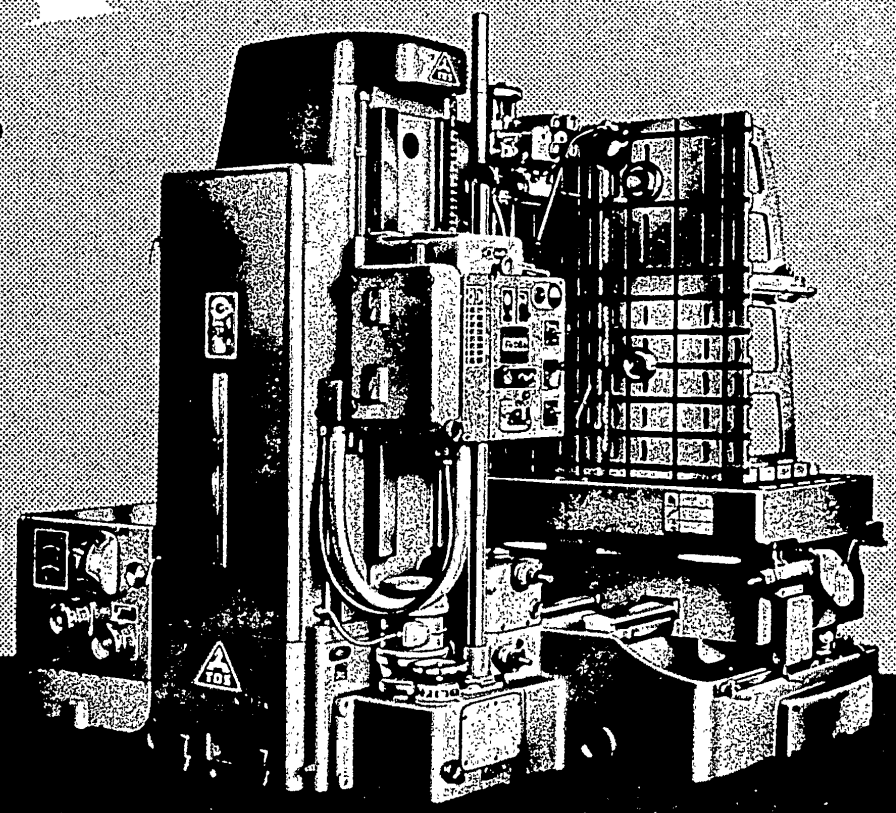
ELOXA



AUTOMATIC DIE-SINKING MACHINE

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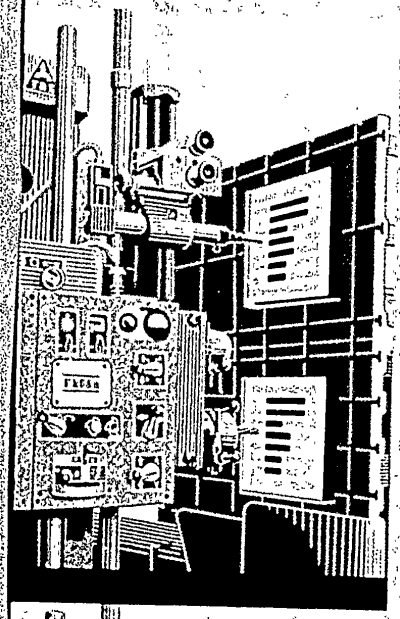
The machine produces complicated and irregular shapes of dies, moulds, metal patterns, templates and cams by three dimensional copying from patterns fully automatically and remarkably accurately. The machine thus replaces, in this branch of manufacture, time consuming, and costly manual work and eliminates almost completely the danger of rejects. At the same time finishing operations are reduced to a minimum and often eliminated altogether.

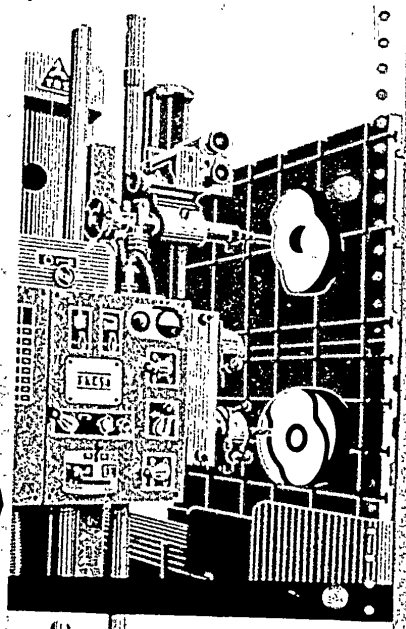
The following very small time lags between the impulses of the tracer and the engagement and disengagement of the movements of the cross slide, table or spindle head have been attained by a novel, the maker's own design of all the tracers and an improved method of connecting the electrical instruments (patents pending in Czechoslovakia and abroad): practically zero for engagements, only 0.005 sec for disengagements. This rapid reaction to the impulses of the tracer as well as the efficient electromagnetic brakes of the mechanical movements of the cross slide, table and spindle head and their feed mechanisms made possible the remarkable accuracy of copying which is as high as 0.025 mm (0.001"). The type Fk 08a machine is the basic type intended for copying in coordinates, contour copying and contour and depth copying. The machined part is identical with the copied pattern. On the type Fk 08a milling machine either one large object can be machined or two smaller ones, not wider than 250 mm (10"), simultaneously by means of two tools.

Methods of copying on type Fk 08a die-sinking Machine



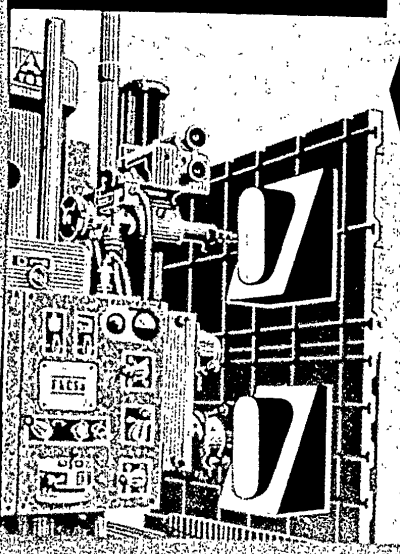
Copying by Strokes

The tracer picks up the shape of the pattern and the cutter copies it in horizontal or vertical straight lines. When one line is cut the copying movements stop and the cutter or table move automatically one stroke - or pitch of lines - which has been set beforehand. The next line is then cut in a direction opposite to that of the first line. This procedure continues until the whole surface of the pattern is copied.



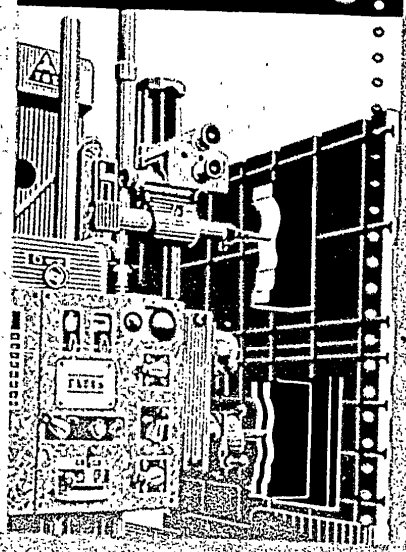
Contour Copying (semi-automatic)

With this method of copying the cover of the contact box of the tracer has to be turned to a position following at least approximately the contour. During this work the longitudinal feed of the table and the vertical feed of the spindle head operate alternately. Copying is therefore done in two planes. Even a thin template may be used as a pattern. Applications: Copying of contour cams, templates, etc.



Contour and Depth Copying (semi-automatic)

A finger-type and contour tracer are assembled into a special combined tracer which the operator controls by hand in the course of the copying operation, same as for contour copying. During this work the longitudinal feed of the table, the transverse feed of the cross slide and the vertical feed of the spindle head operate alternately. Copying is therefore done in three planes. This method is most frequently applied for milling edges of curved surfaces with an angle of ascent or descent of not more than 35°.



Copying without Automatic Strokes

This method of work consists in copying in one plane, either horizontal or vertical, and accordingly either the table or the spindle head (cutter) performs a straight reciprocating movement in a single line. A thin sheet metal template may be used as a pattern and one may also copy from it with a cutter of special shape. This method is used to advantage for the manufacture of bending tools.

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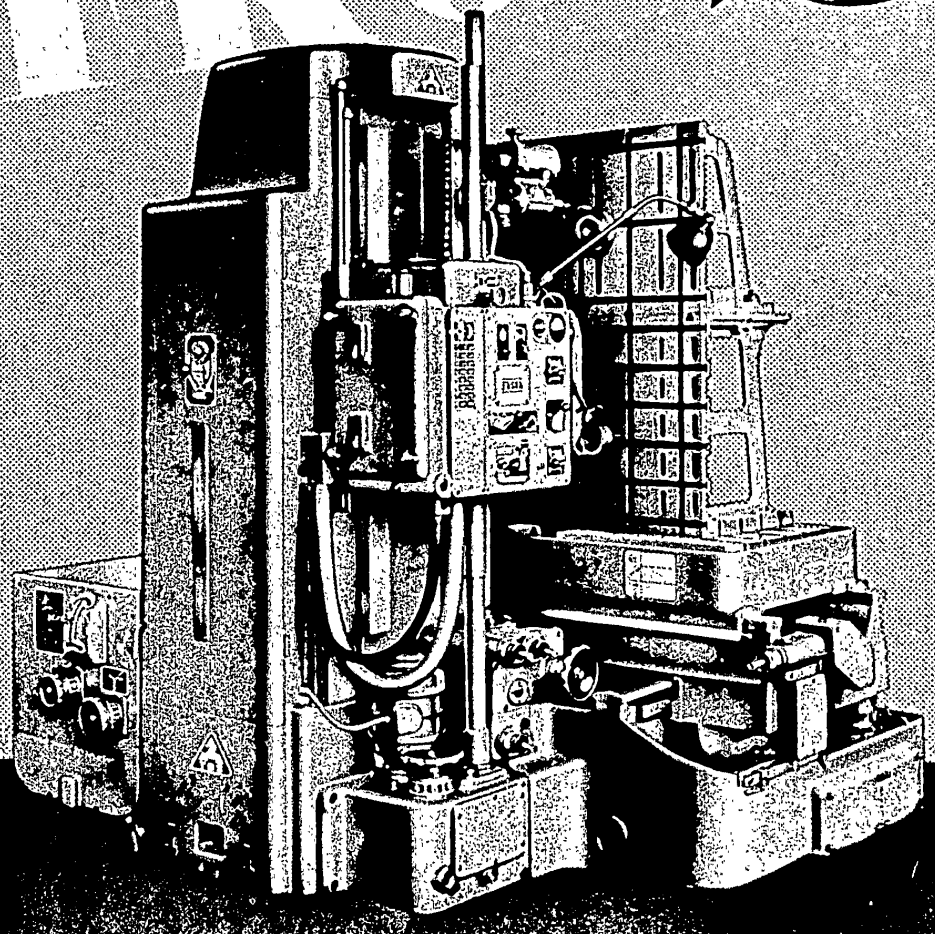
ELOX



AUTOMATIC DIE-SINKING MACHINE

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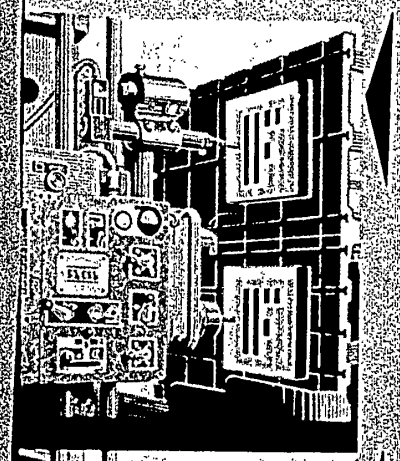
The machine produces complicate and irregular shapes of dies, moulds, metal patterns, templates and cams by three dimensional copying from patterns fully automatically and remarkably accurately. The machine thus replaces, in this branch of manufacture, time consuming and costly manual work and eliminates almost completely the danger of rejects. At the same time finishing operations are reduced to a minimum and often eliminated altogether.

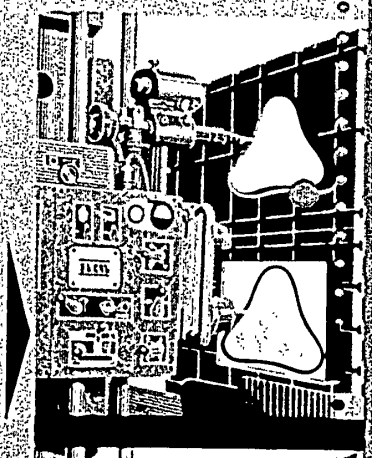
The following very small time lags between the impulses of the tracer and the engagement and disengagement of the movements of the cross slide, table or spindle head have been attained by a novel, the maker's own design of all the tracers and an improved method of connecting the electrical instruments (patents pending in Czechoslovakia and abroad): practically zero for engagements, only 0.005 sec for disengagements. This rapid reaction to the impulses of the tracer as well as the efficient electromagnetic brakes of the mechanical movement of the cross slide, table and spindle head and their feed mechanisms made possible the remarkable accuracy of copying which is as high as 0.025 mm (0.001"). The type Fk 08b machine offers the same possibilities of work as the type Fk 08a machine, i. e. copying in coordinates, contour copying and contour and depth copying but it also permits the milling of objects which are a mirror image of the pattern and copying with the tracer carriage at rest.

Methods of copying on type Fk 08b die-sinking machine



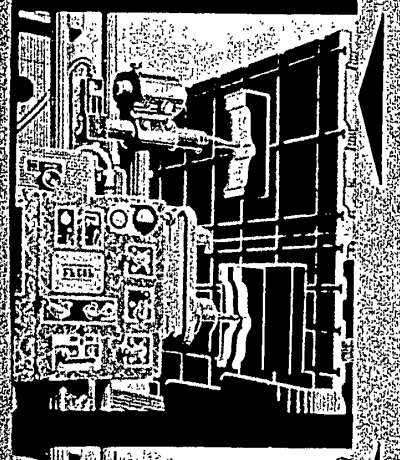
Copying by Strokes

The tracer picks up the shape of the pattern and the cutter copies it in horizontal or vertical straight lines. When one line is cut the copying movements stop and the cutter or table move automatically one stroke – or pitch of lines – which has been set beforehand. The next line is then cut in a direction opposite to that of the first line. This procedure continues until the whole surface of the pattern is copied.



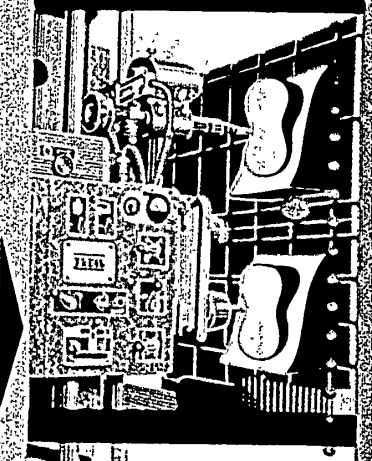
Contour Copying (semi-automatic)

With this method of copying the cover of the contact box of the tracer has to be turned to a position following at least approximately the contour. During this work the longitudinal feed of the table and the vertical feed of the spindle head operate alternately. Copying is therefore done in two planes. Even a thin template may be used as a pattern. Application: Copying of contour cams, templates, etc.



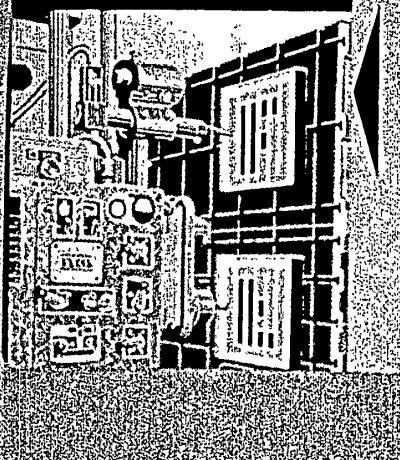
Copying without Automatic Strokes

This method of strokes consists in copying in one plane, either horizontal or vertical, and accordingly either the table or the spindle head (cutter) perform a straight reciprocating movement in a single line. A thin sheet metal template may be used as a pattern and one may also copy from it with a cutter of special shape. This method is used to advantage for the manufacture of bending tools.



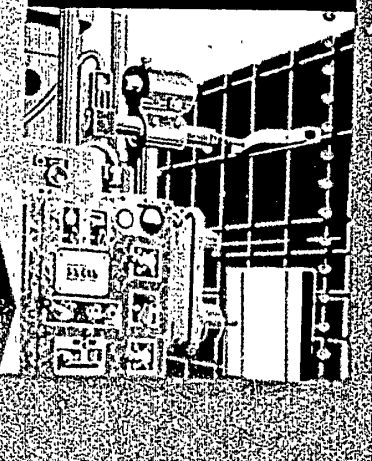
Contour and Depth Copying (semi-automatic)

A finger-type and contour tracer are assembled into a special combined tracer which the operator controls by hand in the course of the copying operation, same as for contour copying. During this work the longitudinal feed of the table, the transverse feed of the cross slide and the vertical feed of the spindle head operate alternately. Copying is therefore done in three planes. This method is most frequently applied for milling edges of curved surfaces with an angle of ascent or descent of not more than 75°.



Copying of Object which is Mirror Image of Pattern

is remarkably accurate, because it is only done by reversing the lead screw of the independent tracer carriage. This method is very advantageous for the production of dies for the forging of parts of which "left hand" and "right hand" versions are required. A single pattern is necessary for the manufacture of such dies. Contour copying by this method is also possible.



Copying with Tracer Carriage at Rest

When the tracer of the tracer carriage, which is at rest, follows the contour of a thin sheet metal template (e. g. 2 mm 5/64") but the milling spindle head moves vertically, the shape of an object up to 800 mm (32") high can be machined by this method.

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SPECIFICATION:

MAIN DATA:

Working surface of table	mm	1450 × 200	57" × 21"
Number, width and distance of T-slots of table	mm	5 × 18 × 130	5 × 23.32" × 5⅛"
Height of working surface of table above floor	mm	950	37"
Clamping surface of two two-part angle plate fixtures	mm	1140 × 1325	44⅞" × 52"
Movement of top part of angle plate fixture in direction of centre-line of cutter	mm	350	13⅞"
Automatic longitudinal travel of table	mm	1000	39⅜"
Automatic transverse travel of slide, toward cutter-away from cutter	mm	400	15¾"
Sliding movement of bearing sleeve of milling spindle	mm	200	7⅞"
Automatic vertical travel of spindle head	mm	800	31½"
Highest position of upper milling cutter above table	mm	1025	40⅜"
Highest position of lower milling cutter above table	mm	775	30½"
Minimum/maximum distance end of milling spindle to clamping surface of angle plate fixtures with spindle bearing sleeve retracted	mm	0/700	0/27½"
Maximum vertical distance tracer to lower milling cutter	mm	750	29½"
Maximum vertical distance tracer to upper milling cutter	mm	160	6⅜"
Maximum surface of machined workpiece	m²	0.8	8.6 sq. ft
Maximum weight of machined workpiece	approx. kg	2500	5500 lbs

MILLING SPINDLES:

Taper in standard milling spindle, as required	No.	3 Morse or Metric 24	
Taper in strengthened milling spindle, as required	No.	5 Morse or Metric 40	
Diameter of bearing sleeves of milling spindles,	mm	120	4¾"
Number of spindle speeds in each range, in either direction of rotation		8	
Standard range of spindle speeds	r. p. m.	70 to 800	
Higher range of spindle speeds	r. p. m.	335 to 3600	

FEEDS:

Number of rates of feed		8	
Rates of longitudinal feed of table and vertical feed of spindle head per minute	mm	20 to 225	25/32" to 8⅞"
Rates of transverse feed of slide per minute	mm	13.5 to 150	17/32" to 5⅞"
Longitudinal rapid travel of table and vertical rapid travel of spindle head per minute	mm	1500	59"
Pitch of automatic strokes: horizontal, vertical: number		10	
range	mm	0.25 to 15	0.01" to 19/32"

DRIVE:

Electric motor of milling spindle drive, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	3
El. motor of feed box 380/220 V., 50 cycles, 920 r. p. m.	kW	0.75
Two electric motors for rapid travels, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	1.1
El. motor of coolant pump, 380/220 V., 50 c., 2900 r. p. m.	kW	0.28
D. C. Mot. Gen. Set: Dynamo 110 V., 1390 r. p. m.	kW	0.5
Electric motor 380/220 V., 50 cycles, 1390 r. p. m.	kW	0.75
Total input	approx. kW	7

NSIONS AND WEIGHTS:

Floor space of machine	mm	2330 × 2530	92" × 100"
Working area required	mm	2330 × 2820	92" × 111"
Height of machine	mm	2500	98"
Maximum height of machine (working)	mm	3030	119"
Net weight of machine with standard equipment, electric motors and electrical equipment	approx. kg	7800	17,200 lbs
Weight of el. motor of milling spindle drive (3 kW)	approx. kg	54	119 lbs
Weight of electric motor of feed box (0.75 kW)	approx. kg	24	53 lbs
Weight of both el. mot. for rapid trav. (1.1 kW) each	approx. kg	46	101 lbs
Weight of el. motor of coolant pump (0.28 kW)	approx. kg	6	13 lbs
Weight of el. mot. of mot. gener. set (0.75 kW)	approx. kg	22	49 lbs
Weight of dynamo (110 Volts, 0.5 kW)	approx. kg	30	66 lbs
Weight of all other electrical equipment	approx. kg	172	379 lbs
Weight of railway packing	approx. kg	700	1540 lbs
Weight of seaworthy packing	approx. kg	1000	2200 lbs
Dimensions of seaworthy packing	approx. kg	2.7 × 2.5 × 2.75	106" × 98" × 108"
Volume of railway packing	approx. cu. metres	14.3	576 cu. ft.
Volume of seaworthy packing	approx. cu. metres	17.85	630 cu. ft.

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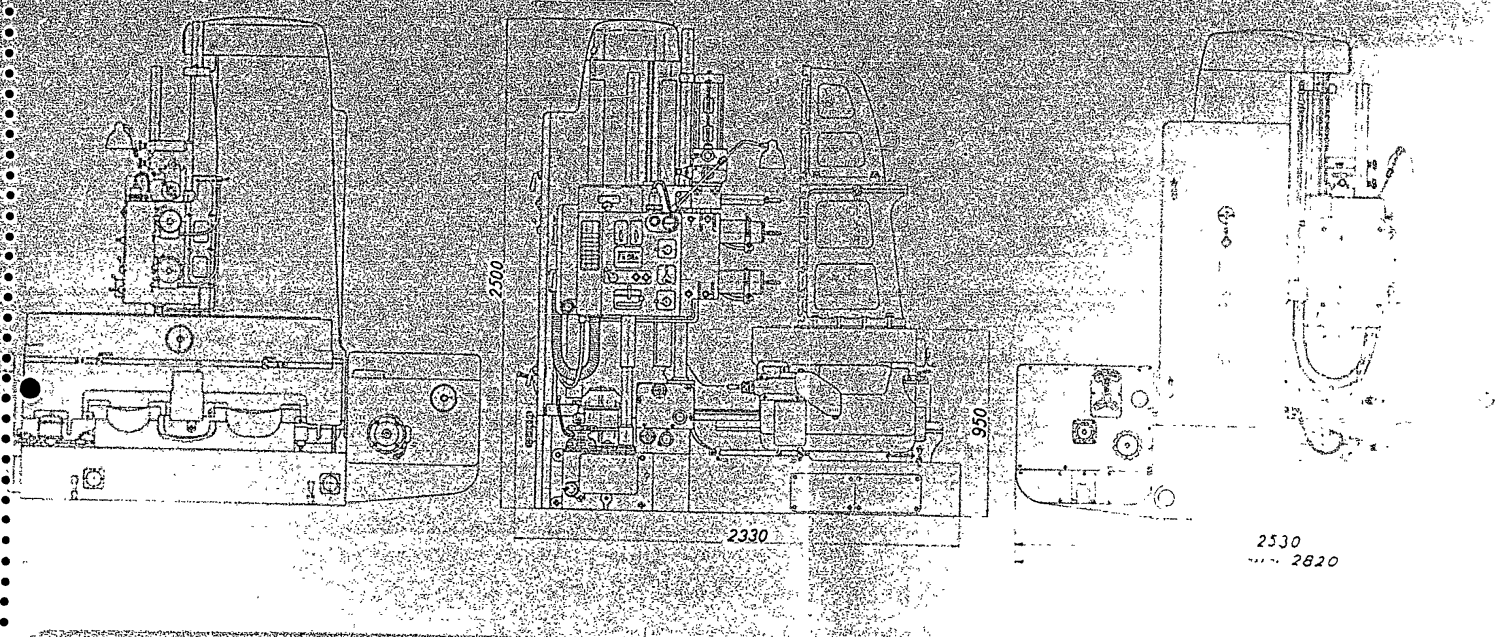

STANDARD EQUIPMENT:

The price of the machine includes the following standard equipment supplied without special order:
2 two-part angle plate fixtures with one crank for fixing pattern and work piece - 1 cylindrical supporting sleeve of milling spindle with plug in spindle taper - 1 tapered supporting sleeve of milling spindle with plug in spindle taper - 1 change wheel for changing range of spindle speeds - 1 finger-type tracer - 2 tracer fingers - 2 spare high speed relays - 1 complete spare electromagnetic clutch - 6 spare lead-in carbons for the electromagnetic clutches - fan-type feeler gauges for measuring gaps between tracer contacts - 5 coolant splash guards - 5 reducing sleeves with reduction pieces of clamping screws - 2 milling cutters - 2 milling mandrel and cutter fixing screws - hand crank - set of standard and various special spanners - 1 screw driver - 1 grease gun for grease and heavy oil - 1 oil can - 1 sheet metal funnel - 1 precision test certificate - 1 instruction book for the machine.

SPECIAL EQUIPMENT:

Supplied only to special order against extra charge:

Tracer fingers to suit shapes of cutters with appropriate allowances for roughing or finishing.
Contour tracer.
Reducing sleeves for tapers of milling spindles with No. 5 Morse, No. 3 Morse, Metric 40 or Metric 24 outer tapers and inner tapers as required with reduction pieces of clamping screws.
Cutters: Cylindrical end cutters, cylindrical end cutters with rounded-off corners, cylindrical end cutters with radius, tapered end cutters with radius, etc.
Cabinet for hand tools and cutters.

IMPORTANT:

Kindly state in your order:

1. The system of the power supply and the rated voltage.
2. The tapers in the milling spindles of the machine.

It is recommended to order the special equipment together with the machine. In case of a later order the supply of the special equipment together with the machine cannot be guaranteed.

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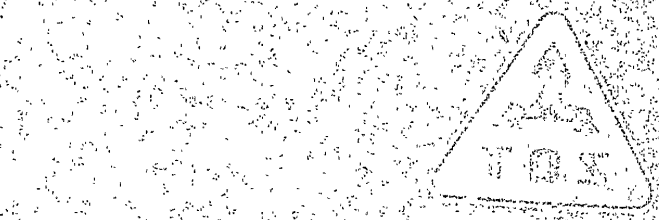

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Our products are constantly being improved upon. The description, illustrations and data can therefore not always agree with the latest design of the machine or equipment in detail and consequently are not binding.

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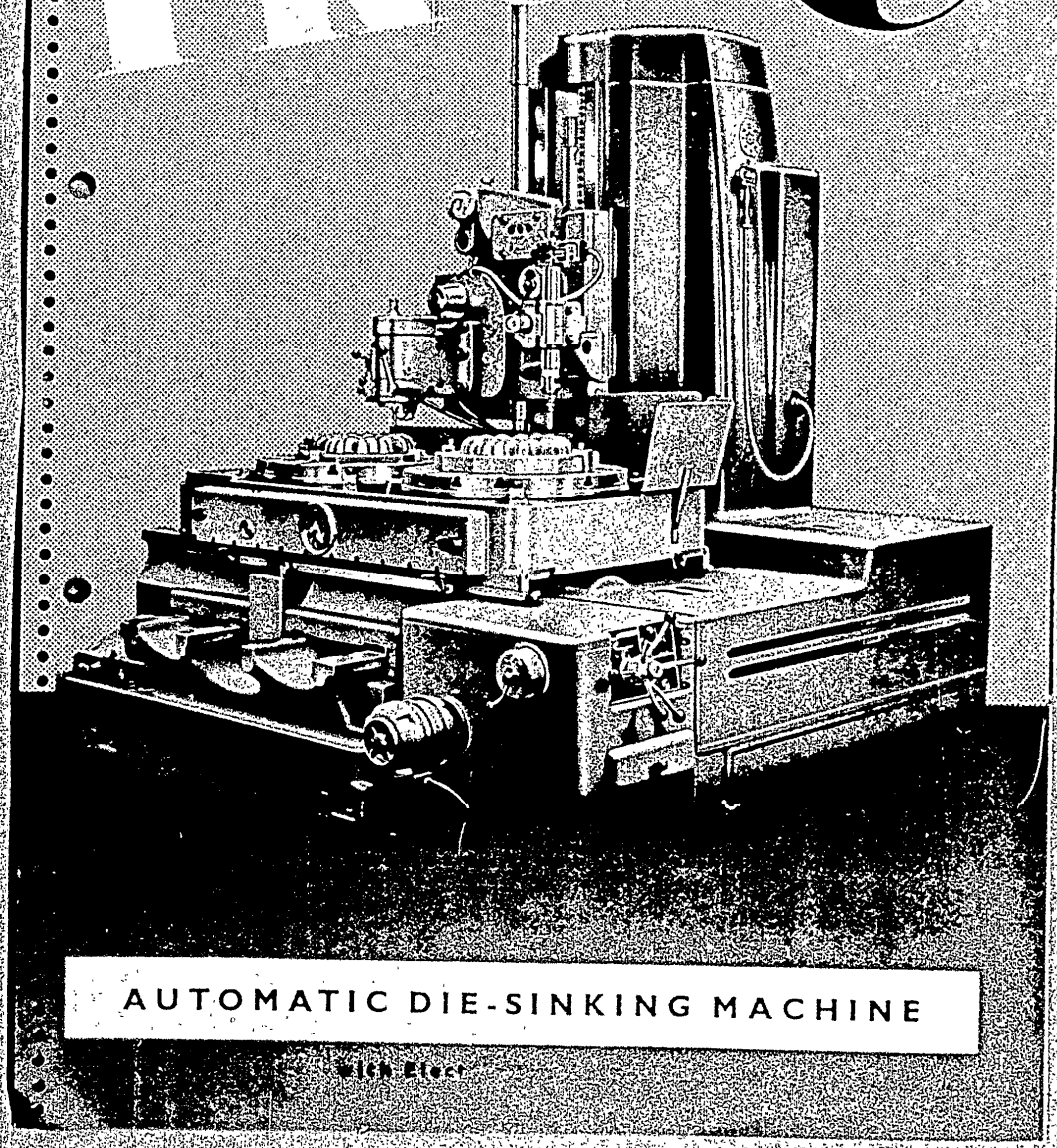

AUTOMATIC DIE-SINKING MACHINE

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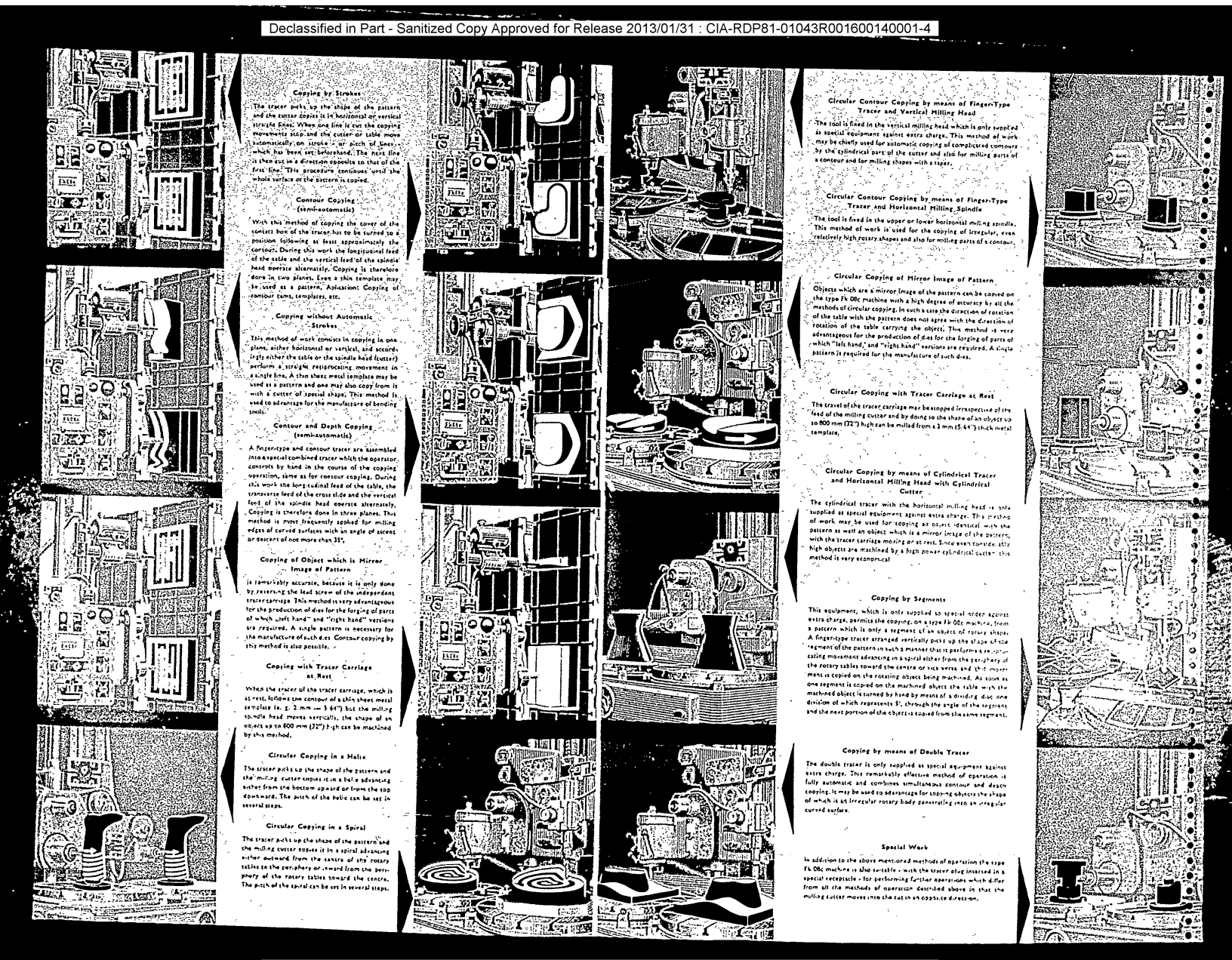

Copying by Strokes

The tracer picks up the shape of the pattern and the cutter copies it in horizontal or vertical straight lines. When one line is cut the copying movements stop and the cutter or table move automatically, on stroke - or pitch of lines - which has been set beforehand. The next line is then cut in a direction opposite to that of the first line. This procedure continues until the whole surface of the pattern is copied.

Contour Copying (semi-automatic)

With this method of copying the cover of the contact box of the tracer has to be turned to a position following at least approximately the contours. During this work the longitudinal feed of the table and the vertical feed of the spindle head operate alternately. Copying is therefore done in two planes. Even a thin template may be used as a pattern. Application: Copying of contour cams, templates, etc.

Copying without Automatic Strokes

This method of work consists in copying in one plane, either horizontal or vertical, and accordingly either the table or the spindle head (cutter) perform a straight reciprocating movement in a single line. A thin sheet metal template may be used as a pattern and one may also copy from it with a cutter of special shape. This method is used to advantage for the manufacture of bending tools.

Contour and Depth Copying (semi-automatic)

A finger-type and contour tracer are assembled into a special combined tracer which the operator controls by hand in the course of the copying operation, same as for contour copying. During this work the longitudinal feed of the table, the transverse feed of the cross slide and the vertical feed of the spindle head operate alternately. Copying is therefore done in three planes. This method is most frequently applied for milling edges of curved surfaces with an angle of ascent or descent of not more than 35°.

Copying of Object which is Mirror Image of Pattern

is remarkably accurate, because it is only done by reversing the lead screw of the independent tracer carriage. This method is very advantageous for the production of dies for the forging of parts of which „left hand" and „right hand" versions are required. A single pattern is necessary for the manufacture of such dies. Contour copying by this method is also possible.

Copying with Tracer Carriage at Rest

When the tracer of the tracer carriage, which is at rest, follows the contour of a thin sheet metal template (e. g. 2 mm = 5.64") but the milling spindle head moves vertically, the shape of an object up to 800 mm (72") high can be machined by this method.

Circular Copying in a Helix

The tracer picks up the shape of the pattern and the milling cutter copies it in a helix advancing either from the bottom upward or from the top downward. The pitch of the helix can be set in several steps.

Circular Copying in a Spiral

The tracer picks up the shape of the pattern and the milling cutter copies it in a spiral advancing either outward from the centre of the rotary tables to the periphery or inward from the periphery of the rotary tables toward the centre. The pitch of the spiral can be set in several steps.

Circular Contour Copying by means of Finger-Type Tracer and Vertical Milling Head

The tool is fixed in the vertical milling head which is only supplied as special equipment against extra charge. This method of work may be chiefly used for automatic copying of complicated contours by the cylindrical part of the cutter and also for milling parts of a contour and for milling shapes with a taper.

Circular Contour Copying by means of Finger-Type Tracer and Horizontal Milling Spindle

The tool is fixed in the upper or lower horizontal milling spindle. This method of work is used for the copying of irregular, even relatively high rotary shapes and also for milling parts of a contour.

Circular Copying of Mirror Image of Pattern

Objects which are a mirror image of the pattern can be copied on the type Fk 08c machine with a high degree of accuracy by all the methods of circular copying. In such a case the direction of rotation of the table with the pattern does not agree with the direction of rotation of the table carrying the object. This method is very advantageous for the production of dies for the forging of parts of which "left hand," and "right hand" versions are required. A single pattern is required for the manufacture of such dies.

Circular Copying with Tracer Carriage at Rest

The travel of the tracer carriage may be stopped irrespective of the feed of the milling cutter and by doing so the shape of an object up to 800 mm (72") high can be milled from a 2 mm (5.64") thick metal template.

Circular Copying by means of Cylindrical Tracer and Horizontal Milling Head with Cylindrical Cutter

The cylindrical tracer with the horizontal milling head is only supplied as special equipment against extra charge. This method of work may be used for copying an object identical with the pattern as well an object which is a mirror image of the pattern, with the tracer carriage moving or at rest. Since even considerably high objects are machined by a high power cylindrical cutter this method is very economical

Copying by Segments

This equipment, which is only supplied to special order against extra charge, permits the copying, on a type Fk 08c machine, from a pattern which is only a segment of an object of rotary shape. A finger-type tracer arranged vertically picks up the shape of the segment of the pattern in such a manner that it performs a reciprocating movement advancing on a spiral either from the periphery of the rotary tables toward the centre or vice versa and this movement is copied on the rotating object being machined. As soon as one segment is copied on the machined object the table with the machined object is turned by hand by means of a dividing disc one division of which represents 5°, through the angle of the segment and the next portion of the object is copied from the same segment.

Copying by means of Double Tracer

The double tracer is only supplied as special equipment against extra charge. This remarkable effective method of operation is fully automatic and combines simultaneous contour and depth copying. It may be used to advantage for copying objects the shape of which is an irregular rotary body penetrating into an irregular curved surface.

Special Work

In addition to the above mentioned methods of operation the type Fk 08c machine is also suitable - with the tracer stud inserted in a special receptacle - for performing further operations which differ from all the methods of operation described above in that the milling cutter moves into the cut in an opposite direction.

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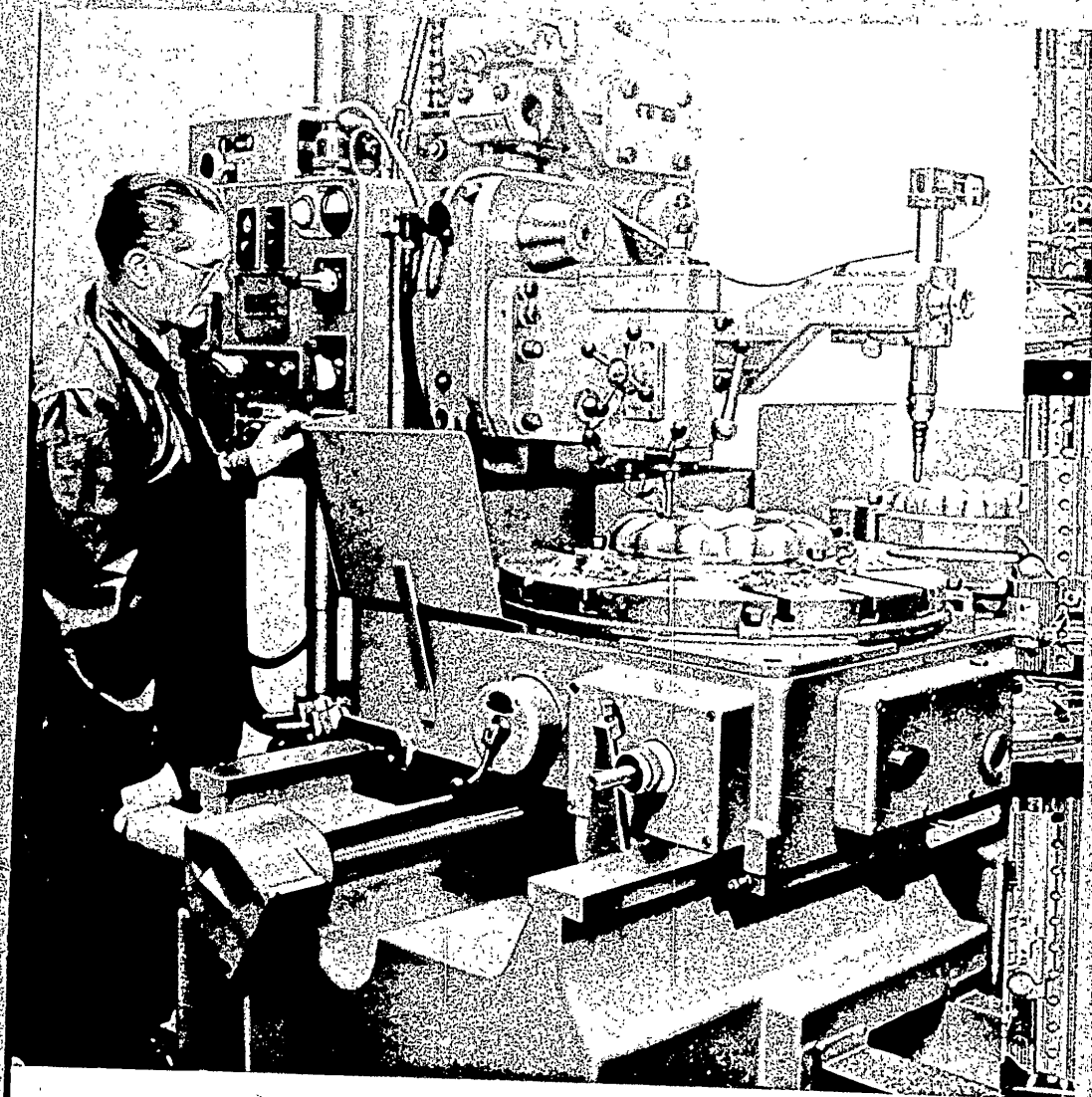

The machine produces complicated and irregular shapes of dies, moulds, metal patterns, templates and cams by three dimensional copying from patterns fully automatically and remarkably accurately. The machine thus replaces, in this branch of manufacture, time consuming and costly manual work and eliminates almost completely the danger of rejects. At the same time finishing operations are reduced to a minimum and often eliminated altogether. The following very small time lags between the impulses of the tracer and the engagement and disengagement of the movements of the cross slide, table or spindle head have been attained by a novel, the maker's own design of all the tracers and an improved method of connecting the electrical instruments (patents pending in Czechoslovakia and abroad): practically zero for engagements, only 0,005 sec for disengagements. This rapid reaction to the impulses of the tracer as well as the efficient electromagnetic brakes of the mechanical movement of the cross slide, table and spindle head and their feed mechanisms made possible the remarkable accuracy of copying which is as high as 0,025 mm (0,001"). The type Fk 08c machine offers the same possibilities of work as the type Fk 08a and Fk 08b machines, i. e. copying in coordinates, contour copying (semi-automatic), contour and depth copying (semi-automatic), copying of mirror image of pattern and copying with tracer carriage at rest, but is has, in addition, two rotary tables for circular copying, one of which carries the pattern, the other the machined object.
The type Fk 08c milling machine may be used for the following methods of copying:

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SPECIFICATION:

MAIN DATA:

Working surface of table	mm	2 × 700	2 × 27 9/16"
Number, width and distance of T-slots of table	mm	3 × 18 × 130	3 × 23 32/64" × 5 1/16"
Hole in centre of rotary tables, dia	mm	110 H 7	4 1/16"
Height of working surface of table above floor	mm	1025	40 3/16"
Clamping surface of two-part angle plate fixtures	mm	1140 × 1325	44 55/64" × 52 5/8"
Movement of top part of angle plate fixture in direction of centre line of cutter	mm	350	13 25/64"
Automatic longitudinal travel of table	mm	1000	39 3/8"
Automatic transverse travel of slide, toward cutter-away from cutter	mm	400	15 3/4"
Sliding movement of bearing sleeve of milling spindle	mm	200	7 7/8"
Automatic vertical travel of spindle head	mm	800	31 1/2"
Highest position of upper milling cutter above table	mm	950	37 3/8"
Highest position of lower milling cutter above table	mm	700	27 9/16"
Minimum/maximum distance end of milling spindle to clamping surface of angle plate fixtures with spindle bearing sleeve retracted	mm	0-550	0-22"
Maximum vertical distance tracer to lower milling cutter	mm	750	29 33/64"
Maximum vertical distance tracer to upper milling cutter	mm	160	6 19/64"
Maximum surface of machined workpiece	m²	0.8	8.6 sq. ft.
Maximum weight of machined workpiece	approx. kg	2500	5500 lbs

MILLING SPINDLES:

Taper in standard milling spindle, as required	No.	3 Morse or Metric 24	
Taper in strengthened milling spindle, as required	No.	5 Morse or Metric 40	
Diameter of bearing sleeves of milling spindles	mm	120	4 3/4"
Number of spindle speeds in each range in either direction of rotation		8	
Standard range of spindles speeds	r. p. m.	70 to 800	
Higher range of spindle speeds	r. p. m.	335 to 3600	

FEEDS:

8 number of rates of feed - Longitudinal feed of table and vertical feed of spindle head per minute	mm	20 to 225	25/32" to 8 7/8"
Rates of transverse feed of slide per minute	mm	13.5 to 150	17/32" to 5 29/32"
Longitudinal rapid travel of table and vertical rapid travel of spindle head per minute	mm	1500	59"
Pitch of automatic strokes; horizontal or vertical, 10 rates - range	mm	0.25 to 15	0.01" to 19/32"
Pitch produced by automatic feed for circular copying in a helix 8 rates - range	mm	0.4 to 10	0.016" to 25/64"
Pitch produced by automatic feed for circular copying in a spiral: 8 rates - range	mm	0.26 to 6.6	0.01" to 17/64"

DRIVE:

Electric motor of milling spindle drive, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	3
El. motor of feed box 380/220 V., 50 cycles, 920 r. p. m.	kW	0.75
Two electric motors for rapid travels, 380/220 Volts, 50 cycles, 1420 r. p. m.	kW	1.1
El. motor of coolant pump, 380/220 V., 50 c., 2800 r. p. m.	kW	0.28
D. C. Mot. Gen. Set: Dynamo 110 V., 1390 r. p. m.	kW	0.5
Electric motor 380/220 V., 50 cycles, 1390 r. p. m.	kW	0.75
Total input	approx. kW	7

DIMENSIONS AND WEIGHTS:

Floor space of machine	mm	2450 × 3650	96 1/2" × 144"
Working area required	mm	2450 × 2940	96 1/2" × 115 3/4"
Height of machine	mm	2500	98"
Maximum height of machine (working)	mm	3030	119"
Net weight of machine with standard equipment, electric motors and electrical equipment	approx. kg	9000	19 840 lbs
Weight of el. motor of milling spindle drive (3 kW)	approx. kg	54	119 lbs
Weight of electric motor of feed box (0.75 kW)	approx. kg	24	53 lbs
Weight of both el. mot. for rapid trav. (1.1 kW each)	approx. kg	46	101 lbs
Weight of el. motor of coolant pump (0.28 kW)	approx. kg	6	13 lbs
Weight of el. mot. of mot. genar. set (0.75 kW)	approx. kg	22	49 lbs
Weight of dynamo (110 Volts, 0.5 kW)	approx. kg	30	66 lbs
Weight of all other electrical equipment	approx. kg	172	379 lbs
Weight of railway packing	approx. kg	725	1600 lbs
Weight of seaworthy packing	approx. kg	1025	2260 lbs
Dimensions of seaworthy packing	approx. metres	2.85 × 2.5 × 2.75	112" × 98" × 108"
Volume of railway packing	approx. cu. metres	17.15	614 cu. ft.
Volume of seaworthy packing	approx. cu. metres	18.90	667 cu. ft.

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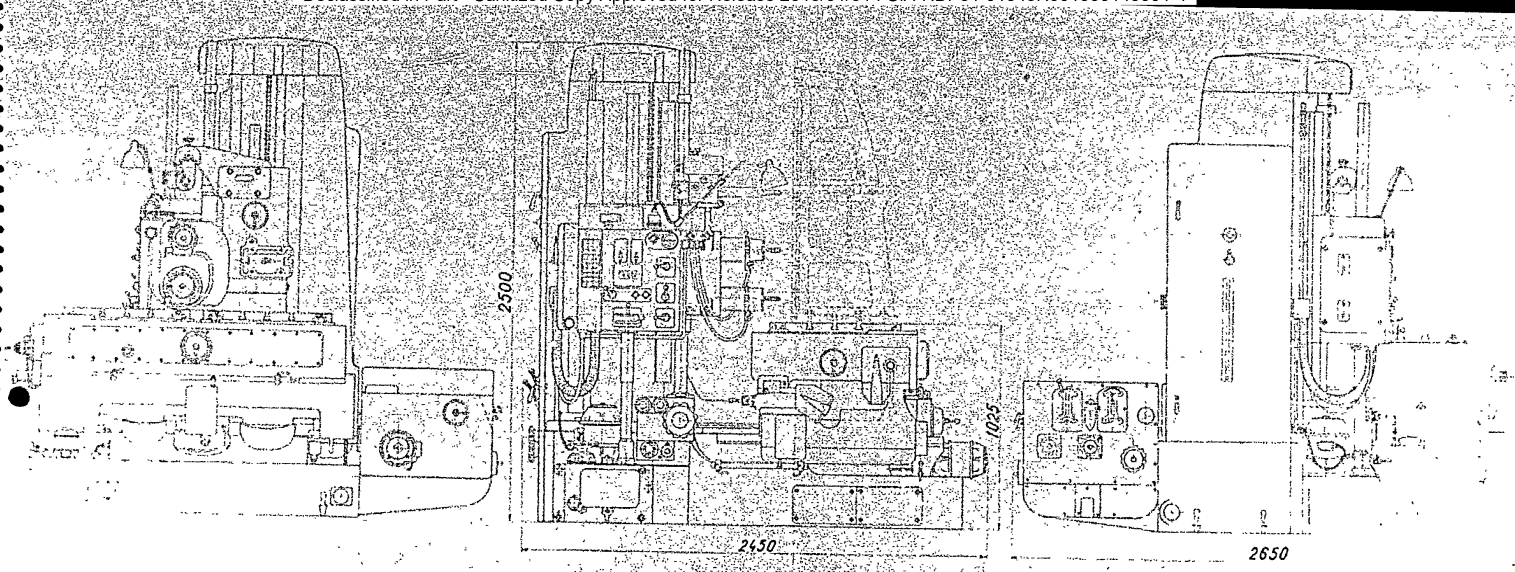
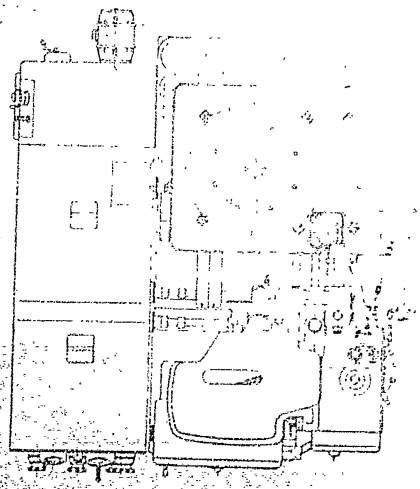


STANDARD EQUIPMENT:

The price of the machine includes the following standard equipment supplied without special order:

2 two-part angle plate fixtures with one crank for fixing pattern and workpiece - 1 cylindrical supporting sleeve of milling spindle with plug in spindle taper - 1 tapered supporting sleeve of milling spindle with plug in spindle taper - 1 change wheel for changing range of spindle speeds - 1 finger-type tracer - 2 tracer fingers - 2 spare high speed relays - 1 complete spare electromagnetic clutch - 6 spare lead-in carbons for the electromagnetic clutches - fan-type feeler gauges for measuring gaps between tracer contacts - 5 coolant splash guards - 5 reducing sleeves with reduction pieces of clamping screws - 2 milling cutters - 2 milling mandrel and cutter fixing screws - hand crank, long - set of standard and various special spanners - 1 screw driver - 1 grease gun for grease and heavy oil - 1 oil can - 1 sheet metal funnel - 1 precision test certificate - 1 instruction book for the machine.



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HORIZONTAL MILLING HEAD

Distance [illegible] of milling head to seating surface [illegible]	mm	[illegible]	[illegible]
Distance [illegible] spindle of milling head [illegible]	mm	705.95	[illegible]
Twist of [illegible] plane		[illegible]	[illegible]
[illegible] spindle of milling head		[illegible]	[illegible]
Distance [illegible] lower edge [illegible]	mm	100	[illegible]
[illegible] of cutter [illegible]	mm	290	[illegible]
Net weight [illegible] head with clamping screw approx	kg	[illegible]	[illegible]

VERTICAL MILLING HEAD

Distance, centre-line of spindle of milling head to seating surface [illegible]	mm	[illegible]	12
[illegible] of spindle of milling head to rotary table with spindle sleeve retracted maximum minimum	mm	400/200 [illegible]	[illegible]
Taper in spindle of milling head as required	No	[illegible] Morse or Metric [illegible]	
Vertical travel of spindle sleeve	mm	50	2
Gear ratio, spindle of machine to spindle of milling head		[illegible]	[illegible]
Net weight of milling head with clamping screw approx	kg	70	lbs 154

SPECIAL EQUIPMENT: Supplied only to special order against extra charge

Carrier for vertical position of tracer.

Contour tracer.

Cylindrical tracer for work with horizontal milling head 1 pick-up roller supplied with tracer

Double tracer for circular copying Permits fully automatic simultaneous contour and depth copying Supplied with one two-part tracer finger

Tracer fingers to suit shapes of cutters with appropriate allowances for roughing or finishing

Horizontal milling head for work with high capacity cylindrical cutter supported at both ends and cylindrical tracer Supplied with one cylindrical cutter.

Vertical milling head forms indispensable supplement of machine for completely automatic contour and circular copying One clamping screw is supplied with head

Equipment for copying by segments permits working from a pattern which is merely a segment of a rotary shape

Reducing sleeves:

a) for tapers of milling spindle with No 5 Morse, No 3 Morse, Metric 40 or Metric 24 outer tapers and inner tapers as required with reduction pieces of clamping screws

b) for tapers of vertical milling head with No 4 Morse or Metric 32 outer tapers and inner tapers as required, with reduction pieces of clamping screws.

Cutters: Cylindrical end cutters, cylindrical end cutters with rounded-off corners, cylindrical end cutters with radius, tapered end cutters with radius etc.

Cabinet for hand tools and cutters.

IMPORTANT!

Kindly state in your order

1 The system of the power supply and the rated voltage.

2. The tapers in the milling spindles of the machine

3 The taper in the spindle of the vertical milling head (when ordered).

It is recommended to order the special equipment together with the machine, in case of a later order the supply of the special equipment together with the machine cannot be guaranteed

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HORIZONTAL MILLING HEAD

Distance centre-line of spindle of milling head to seating surface (overhang)	mm	300	12"
Distance, centre-line of spindle of milling head to rotary table, maxim./minimum	mm	705,95	27 13/32"
Twist of milling head in vertical plane		90°	90°
Gear ratio, spindle of machine to spindle of milling head		1 : 1	1 : 1
Distance, centre line of milling cutter to lower edge of milling head	mm	100	4"
Length of cutting portion of cutter, max	mm	290	11.4"
Net weight of milling head with clamping screw approx	kg	91	lbs 200

VERTICAL MILLING HEAD:

Distance, centre-line of spindle of milling head to seating surface (overhang)	mm	300	12"
Distance, end of spindle of milling head to rotary table with spindle sleeve retracted, maximum/minimum	mm	600 200	23 5/16 7 7/8"
Taper in spindle of milling head, as required	No.	4 Morse or Metric 32	
Vertical travel of spindle sleeve	mm	50	2"
Gear ratio, spindle of machine to spindle of milling head		1 : 1	1 : 1
Net weight of milling head with clamping screw approx	kg	70	lbs 154

SPECIAL EQUIPMENT: Supplied only to special order against extra charge:

Carrier for vertical position of tracer.
Contour tracer.
Cylindrical tracer for work with horizontal milling head 1 pick-up roller supplied with tracer.
Double tracer for circular copying. Permits fully automatic simultaneous contour and depth copying. Supplied with one two-part tracer finger.
Tracer fingers to suit shapes of cutters with appropriate allowances for roughing or finishing.
Horizontal milling head for work with high capacity cylindrical cutter supported at both ends and cylindrical tracer. Supplied with one cylindrical cutter.
Vertical milling head forms indispensable supplement of machine for completely automatic contour and circular copying. One clamping screw is supplied with head.
Equipment for copying by segments permits working from a pattern which is merely a segment of a rotary shape.
Reducing sleeves:
a) for tapers of milling spindle with No. 5 Morse, No. 3 Morse, Metric 40 or Metric 24 outer tapers and inner tapers as required, with reduction pieces of clamping screws.
b) for tapers of vertical milling head with No. 4 Morse or Metric 32 outer tapers and inner tapers as required, with reduction pieces of clamping screws.
Cutters: Cylindrical end cutters, cylindrical end cutters with rounded-off corners, cylindrical end cutters with radius, tapered end cutters with radius etc.
Cabinet for hand tools and cutters.

IMPORTANT!

Kindly state in your order:

1. The system of the power supply and the rated voltage.
2. The tapers in the milling spindles of the machine.
3. The taper in the spindle of the vertical milling head (when ordered).

It is recommended to order the special equipment together with the machine, in case of a later order the supply of the special equipment together with the machine cannot be guaranteed.

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DRILLING MACHINE

V10

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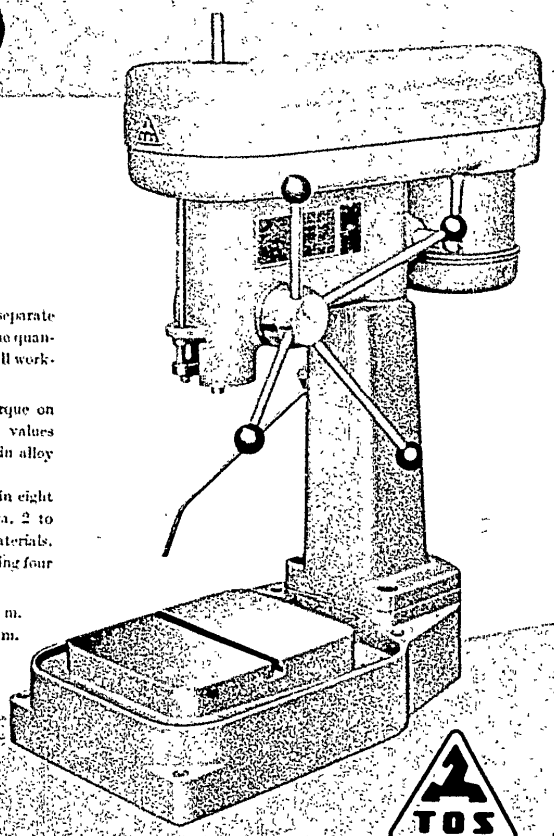

Characteristic Features:

- Wide spindle speed
- Quiet running even at peak output
- Adjustable drilling depth
- Great drilling depth
- Individual coolant pump.

The machines are of the table type, with separate electric motor and are equally well-suited for the quantity and single part production in large and small workshops.

The motor output of 0.55/0.7 HP and the torque on spindle of 80 kgcm (70 lbs. in) refer to the values of drilling with a HSS drill up to dia. 10 mm in alloy steel 100 kg/mm² tensile.

The spindle speed range of 500—1000 r. p. m. in eight speeds enables economical drilling of holes dia. 2 to 10 mm (0.08" to 0.4") in all commonly used materials. This range comprises two speed bands each having four speeds:—

Speed band I. ranging from 500 to 2000 r. p. m.
Speed band II. ranging from 1000 to 4000 r. p. m.

TOS

HEADSTOCK

The headstock may be swivelled on the column. The spindle is driven by a V-belt with provision of belt tension adjustment. The main drive motor is started by operating the lever of the speed-changing switch, which also serves for changing the two-spindle speed bands. The spindle is fed by hand. The drilling depth is adjusted on a millimetre scale. It rotates in ball bearings and is returned to its top position by a spring.

COOLING SYSTEM

The coolant is delivered to the work by an electric pump incorporated in the machine base. Its quantity may be controlled by a tap.

STANDARD EQUIPMENT

(Supplied without a special order). Main drive motor to suit 3×380 V, 50 c/sec., V-belt, belt for drive of pump, cooling attachment, spanner for tightening the spindle nut, chuck dia. 0—10 mm.

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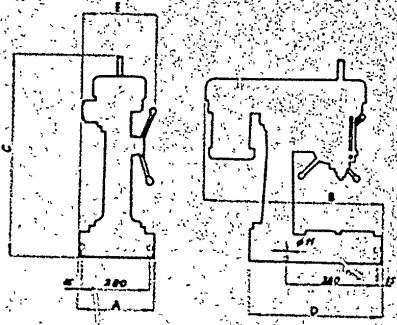
SPECIFICATIONS

Drilling diameter	mm	10	0.4"
Drilling depth	mm	230	9"
Clamping surface of base	mm	220×280	8.7"×11"
Distance, end of spindle to clamping surface of base	mm	280	11"
Distance, centre line of spindle to column	mm	190	7.5"
Spindle speeds: Number		8	8
Range	r. p. m.	500—4000	500—4000
Maximum torque on spindle	kgcm	80	70 lbs. in.
Main drive motor. Speed	r. p. m.	1400—2800	1400/2800
Output	HP	0.55—0.7	0.55/0.7
Floor space required	mm	730×310	28.7"×12.2"
Weight of machine with standard equipment	kg	115	254 lbs.
with packing	kg	135	300 lbs.
with seaworthy packing	kg	180	400 lbs.
Contents boxed	m³	0.47	17 cu. ft.

Normally the machines are supplied with A. C. motors to suit 3×380 V, 50 c/sec. If a machine for another voltage is required, kindly ask for our offer!



A	310	12.2"
B	730	28.5"
C	900	35.2"
D	550	21.6"
E	300	11.8"

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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DRILLING MACHINES

TYPES V 16, VS 16

Heavy duty machines marked by:

Wide spindle speed range,
adjustable drilling depth,
quiet running even at peak output,
ease of operation.

These machines are made in two styles: Table type V 16, and Column type VS 16.

They are driven by individual electric motors with an output of 0.8/1.1 HP. This output and the torque on spindle of 200 kg/cm refer to the values of drilling in alloy steel of 100 kg/mm² tensile with a high speed steel drill up to dia. 16 mm. The spindle speed range of 355—2800 r. p. m. in eight speeds enables economical drilling of holes dia. 3 to 16 mm in all commonly used materials. This range consists of two speed bands each having 4 speeds:

Speed band I ranging from 355 to 1400 r. p. m.
Speed band II ranging from 710 to 2800 r. p. m.

THE HEADSTOCK

is vertically adjustable and may be swivelled on the column. The speeds are changed by shifting the belt on the 4-step pulleys, after removing the headstock cover. The spindle is driven by a V-belt with provision for tension adjustment. The speed bands are changed by the switch of the main drive motor which also serves for starting and stopping the motor. The spindle is fed by hand.

The drilling depth is adjusted on a millimetre scale. The spindle rotates in precision ball bearings and is returned to its top position by a spring. The headstock is lubricated from pressure oilers. The spindle bearings are lubricated while the machine is at rest by pouring the oil into the groove provided in the hub of the driven pulley.

COOLING SYSTEM

Both with the Column Type VS 16 and Table Type V 16 the coolant is delivered by an electric pump incorporated in the machine base, and the quantity of coolant may be controlled by a tap.

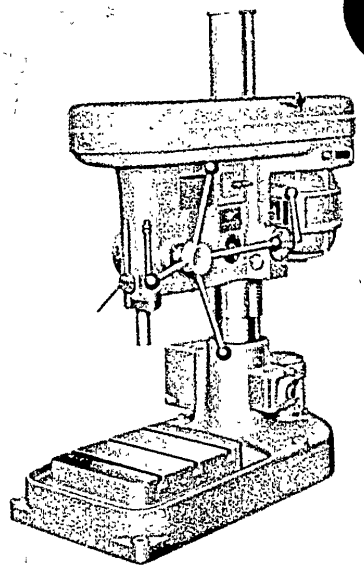
LIGHTING

The working space is illuminated by a reflector mounted inside the headstock (220 V).

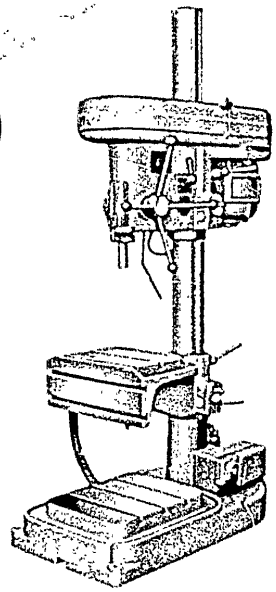
THE TABLE

of VS 16 machine is of the angular type with horizontal and vertical clamping surfaces. It enables the clamping of long parts to be bored lengthwise. The table rests on a bracket which is vertically adjustable and swivels on the column.

V16



VS16



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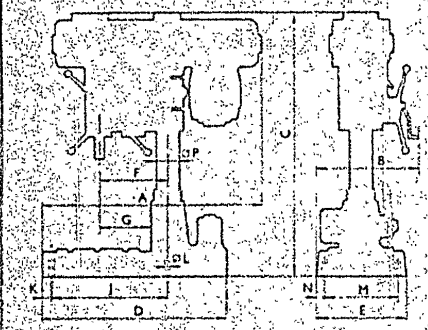
SPECIFICATION:

Type		V 16		VS 16	
Drilling diameter	mm	16	5/8"	16	5/8"
Drilling depth	mm	125	4 7/8"	125	4 7/8"
Taper in spindle	Morse	2	2	2	2
Clamping surface of base	mm	280 × 355	11" × 14"	356 × 450	14" × 17 3/4"
Clamping surface of angular table:					
horizontal surface	mm	-		280 × 350	11" × 13 3/4"
vertical surface	mm			280 × 190	7 1/8" × 18"
Distance, end of spindle to clamping surface:					
of base: maximum	mm	450	14"	1120	44"
minimum	mm	150	5 7/8"	785	31"
Distance, end of spindle to clamping surface of angular table: maximum	mm	-	-	640	25,2"
minimum	mm	-	-	0	0
Distance, centre line of spindle to column	mm	250	10"	250	10"
Vertical motion of headstock	mm	300	11 7/8"	330	13"
Vertical motion of bracket with table	mm	—	—	410	16"
Spindle speeds:					
Speed band I ranging from	r. p. m.	355—1400	355—1400	355—1400	355—1400
Speed band II ranging from	r. p. m.	710—2800	710—2800	710—2800	710—2800
Maximum torque on spindle	kg/cm	200	172 lbs. in.	200	172 lbs. in.
Main drive motor: Speed	r. p. m.	700—1400	700—1400	700—1400	700—1400
Output	HP	0,8/1,1	0,8/1,1	0,8 1,1	0,8/1,1
Floor space required	mm	965×480	18"×19"	530×1030	21"×40"
Weight of machine; with standard equipment	kg	305	680 lbs	450	1000 lbs
with packing	kg	345	760 lbs	520	1150 lbs
with seaworthy packing	kg	440	970 lbs	640	1410 lbs
Contents boxed	cu. m	1	35 cu. ft.	1,7	60 cu. ft.

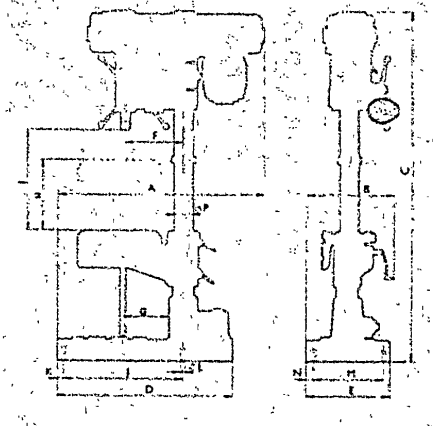
Standard equipment:

Electric motor to suit 3×380 V, 50 cycles with switch, V-belt, cooling system, crank for lifting headstock and table, ejector, operating instruction booklet.

Normally the machines are supplied with A. C. motors to suit 3×380 V, 50 cycles. If a machine for another voltage is required kindly ask for our offer. In ordering, specify voltage, phase and frequency of power supply.



V 16	VS 16
A 965 38,2"	A 1030 40,5"
B 480 18,8"	B 530 20,8"
C 1140 45"	C 1830 72"
D 810 31,8"	D 925 36,4"
E 400 15,7"	E 486 19,0"
F 325 12,8"	F 325 12,8"
G 250 9,8"	G 250 9,8"
J 542,5 21,4"	H 410 16,1"
K 20 0,78"	I 640 25,1"
M 350 13,8"	J 602 23,6"
N 20 0,79"	K 23 0,9"
P 110 4,3"	L 17 0,67"
	M 460 18"
	N 23 0,9"
	P 110 0,43"



As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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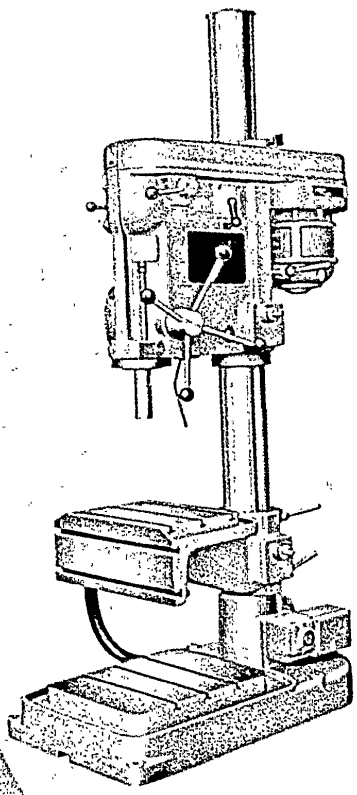
VS 32



OUTSTANDING FEATURES:

Wide range of speeds, adjustable drilling depth, right hand and left hand rotation of spindle, automatic disengagement of feeds, guaranteed exchangeability of spare parts.

These drills satisfy all the demands placed on drilling, reaming and tapping in all kinds of material by the soundness of their design, their generous dimensions, output, speed range and equipment. The drills are intended for single piece manufacture as well as for multiple production in large and in smaller shops.

The output of the motor of 3 HP, the torque on the spindle of 800 kgcm (58 ft-lbs) and the thrust on the spindle of 800 kg (1763 lbs) correspond to drilling with a high speed steel drill up to a diameter of 25 mm (1") in alloy steel of a tensile strength of 100 kg per sq. mm (64 tons per sq. inch) and up to a diameter of 32 mm (1¼") in steel of a tensile strength of 50 kg per sq. mm (32 tons per sq. inch).

The range of speeds of 56 to 2240 r. p. m. arranged in nine steps in geometrical progression permits holes of diameters from 10 to 32 mm (⅜" to 1¼") to be drilled and reamed economically in all commonly used materials. This total range of speeds is arranged in two ranges of six speeds each:

1st range: 56 to 560 r. p. m. for reaming and tapping.

2nd range: 224 to 2240 r. p. m. for drilling.

THE HEADSTOCK has a vertical and a swivelling movement on the column. The gear box is driven by the electric motor by means of a V-belt. An arrangement for tightening the belt is provided. The electric motor is started by means of the lever of a reversing switch which also serves for reversing the spindle rotation.

The machine has two ranges of spindle speeds. The ranges are changed by moving the belt from one step of the two-step belt pulley to the other. The individual speeds are engaged by means of two hand levers. The feed is hand operated as well as power operated. The power feeds are engaged by means of a hand lever and started and stopped by the lever of an automatic clutch which also automatically disengages the feed when the maximum thrust is exceeded, i. e. when the tool becomes blunt or breaks or, in standard operation, when the stop, which has been set beforehand, is reached.

The depth of drilling is set on a millimetre scale. The spindle runs in ball bearings and returns to its upper position by the action of a coil spring. The headstock is lubricated by a circulating worm pump mounted inside the headstock. The end of the spindle sleeve is fitted with a standard flange for the attachment of a multi-spindle drilling head for quantity production.

THE TABLE of the type VS 20 machine is of the angle type with a horizontal and a vertical clamping surface. It permits long pieces to be clamped for drilling in the direction of the longitudinal centre-line. It is mounted on a swivel on a bracket which has a vertical and a swivelling movement on the column of the machine.

COOLING. The coolant is supplied by an electric motor driven pump (220 380 Volts 3-phase, 50 cycles) from a tank formed in the base of the machine. Its quantity can be controlled by a cock.

TYPE VS 32
UPRIGHT DRILL

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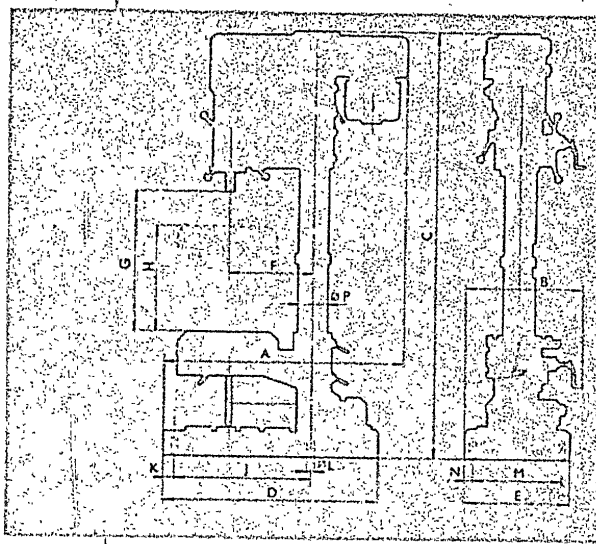
SPECIFICATION:

Drilling diameter	mm	32	1¼"
Drilling depth	mm	200	1¾"
Taper in spindle		No. 4 Morse	
Working surface of bed plate	mm	300 × 300	15¾" × 15¾"
Working surface of angle type table:			
horizontal	mm	315 × 330	12¼" × 13¾"
vertical	mm	250 × 315	7¾" × 2[illegible]"
Distance, end of spindle to working surface of bed plate:			
maximum	mm	1150	44"
minimum	mm	710	29½"
Distance, end of spindle to working surface of angle type table:			
maximum	mm	650	25½"
minimum	mm	0	0
Distance, centre line of spindle to column	mm	280	11"
Vertical travel of headstock	mm	380	14¾"
Vertical travel of bracket with angle type table	mm	440	17¼"
Spindle speeds: number		9	
range	r. p. m.	56 to 2240	
Maximum torque of spindle	kgcm	800	58 ft lbs
Feeds: number		4	
range, per rev	mm	0.11 to 0.45	0.0011 to 0.018"
Maximum thrust on spindle	kg	800	1760 lbs
Electric motor: speed	r. p. m.	1400	
output	HP	3	
Floor space required by machine	mm	620 × 1110	24½" × 43¾"
Weight of machine with standard equipment:			
shipping: net	kg	635	1400 lbs
railway packing	kg	700	1540 lbs
seaworthy packing	kg	850	1875 lbs
Volume of packing case	cu metres	2	71 cu. ft.

STANDARD EQUIPMENT (supplied without special order and included in price of machine): Electric motor 220/380 Volts, three phase 50 cycles, V belt, cooling equipment, crank for raising headstock and table, ejector.

OPTIONAL EQUIPMENT (supplied only to special order and charged separately): Lighting equipment, 220 Volts, 50 cycles (weight 1.5 kg — 3.3 lbs).

The presses are supplied, as a standard design, exclusively with electric motors for 220/380 Volts, three phase, 50 cycles. In cases of other systems of power please ask for a special quotation beforehand. Please state the operating voltage in your order.



A	1110	43.5"
B	620	24.4"
C	2080	82"
D	990	38.8"
E	560	22"
F	375	14.7"
G	650	25.5"
H	440	17.3"
J	682	16.8"
K	23	0.9"
L	17	0.67"
M	514	20.2"
N	23	0.9"
P	140	5.5"

The machines are continuously being improved upon. The particulars stated in the prospectus are therefore not binding in detail.

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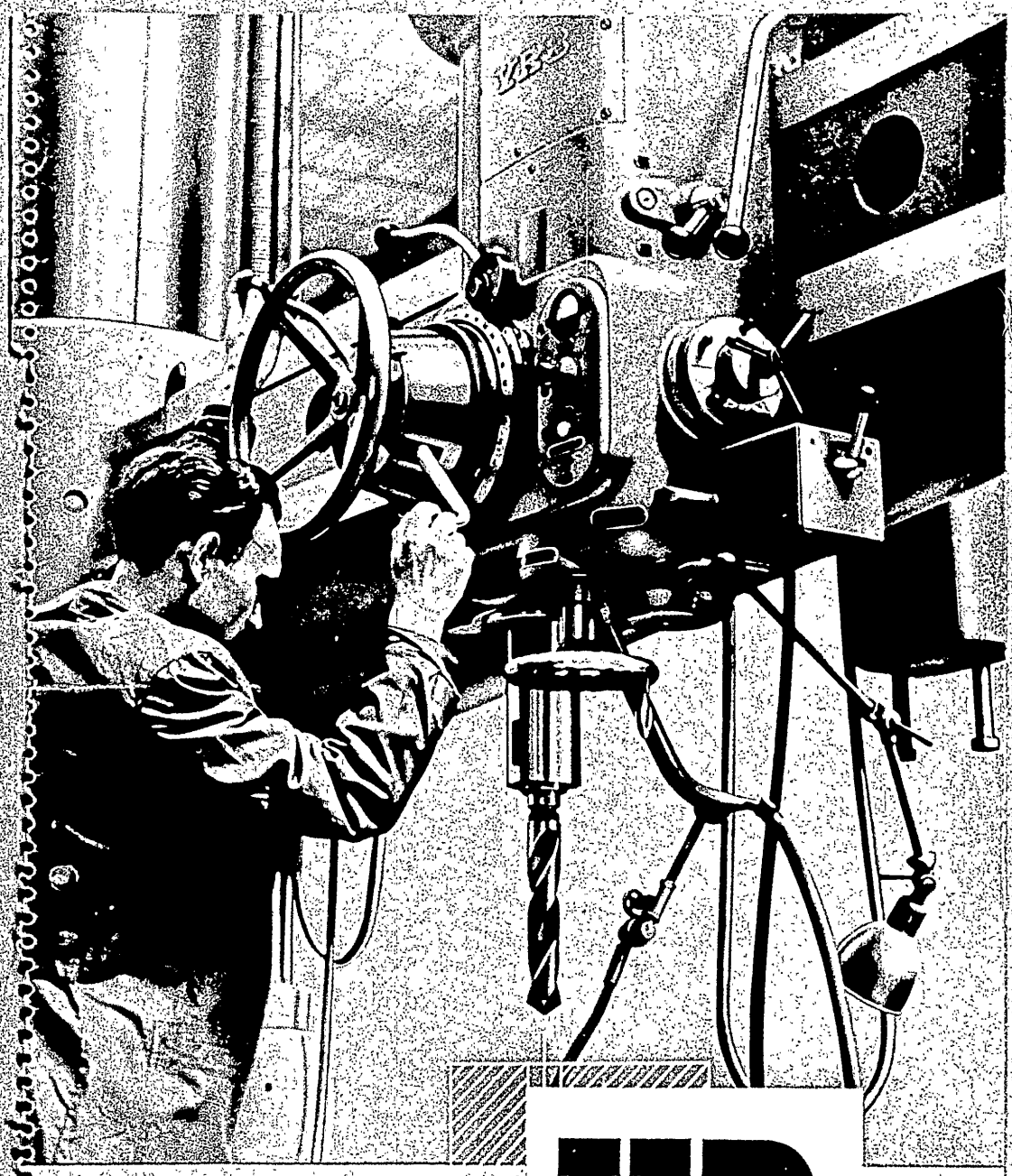

MAS
RADIAL DRILLING MACHINES
Series

VR

TOS

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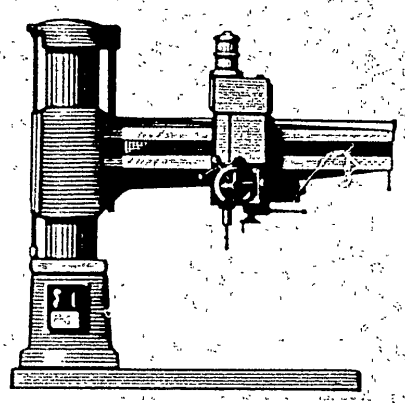
TOS

RADIAL DRILLING MACHINES

Series **VR**

are intended for the drilling and boring of holes and cutting of threads in big and complicated machinery parts. There are many uses for them in single part manufacture as well as in multiple production.
In view of the short times required for setting the machines they are, in conjunction with suitable jigs and fixtures, superior to horizontal boring machines in many respects. They are being built in four sizes on the same fundamentals of design, the special features, description and technical data of which are given below.



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Special features

1 High capacity and sustained high accuracy

2. Large clamping surface of base and wide range of clear heights between spindle and base enables, on one hand, bulky and relatively high pieces to be drilled, on the other hand quite low ones and even metal sheets.

3. Wide range of spindle speeds arranged in 12 steps of standard range with possibility of changing over to a low or high range.

4. Pre-selection of spindle speeds on type VR 4.

5. Wide range of power feeds.

6. Three different spindle feeds: hand feed-coarse, hand feed-fine and power feed.

7. Elevation of arm by power.

8. Efficient locking of arm on column by means of locking nut.

9. Automatic disengagement of power feed when required depth of drilling is reached.

10. Handy and concentrated arrangement of controls on spindle head which substantially reduces setting-up times.

11. Automatic splash lubrication of spindle head.

12. Ample rigidity of machine within limits of taking-over conditions at all working angles of arm and spindle head.

13. Precision manufacture and use of high grade material guarantee long life of machine

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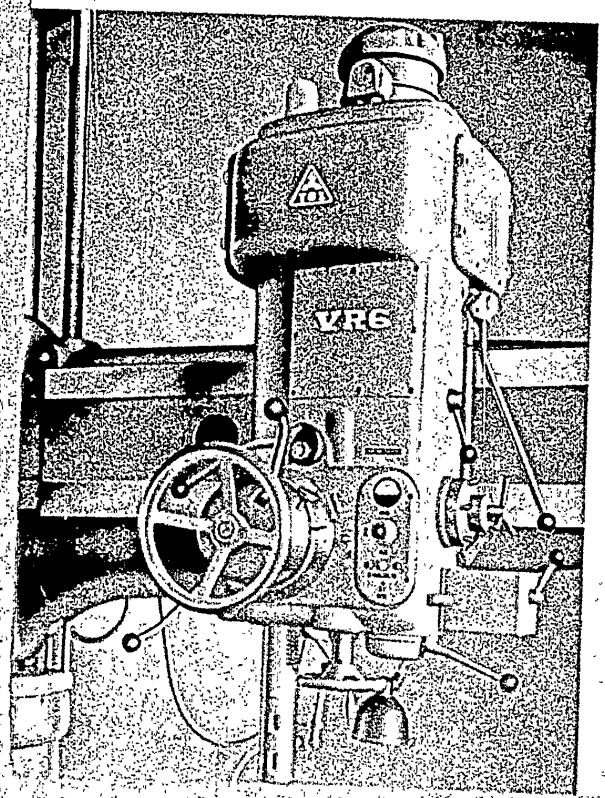
The spindle head

The spindle head forms a totally enclosed box the shape of which has been chosen to eliminate all possibility of distortion and to guarantee a lasting accuracy of the positions of all shafts. All parts of the spindle head are easily accessible when the side covers are removed. The spindle head is easy to move along the arm by means of a hand wheel. The spindle head can be locked in any required position by means of a lever arranged at the right hand side of the spindle head. On the type VR 4 the sleeve is simultaneously locked on the column by the same lever.

The gear box of the spindle head has 12 spindle speeds arranged in geometrical progression with a coefficient of 1.41. The wide range of spindle speeds of the various sizes of machines is given in the table below.

Standard range	VR 2	90	140	224	355	450	560	710	900	1120	1800	2800	4500
	VR 4	45	63	90	125	180	250	355	500	710	1000	1400	2000
	VR 6	16	22 5	31.5	45	63	90	125	180	250	355	500	710
	VR 6	31.5	45	63	90	125	180	250	355	500	710	1000	1400
	VR 8	11 2	16	22 5	31.5	45	63	90	125	180	250	355	500
	VR 8	22.5	31.5	45	63	90	125	180	250	355	500	710	1000
Lower range	VR 2	56	90	140	224	280	355	450	560	710	1120	1800	2800
	VR 4	31	45	63	90	125	180	250	355	500	710	1000	1400
High range	VR 4	63	90	125	180	250	355	500	710	1000	1400	2000	2800
	VR 6	20	28	40	56	80	112	160	224	315	450	630	900
	VR 6	40	56	80	112	160	224	315	450	630	900	1250	1800
	VR 8	16	22 5	31.5	45	63	90	125	180	250	355	500	710
	VR 8	31.5	45	63	90	125	180	250	355	500	710	1000	1400



Spindle Head of Type VR 6 Radial Drilling Machine

The spindle speed of the type VR 4 is engaged by pre-selection. The required speed is set during operation, i. e. while the machine is running, on a scale arranged at the right on the front side of the spindle head. When the preceding operation is finished the spindle is stopped and the preselected speed engaged by moving the lever downward. The speed engaging lever controls, at the same time, the two-directional multi-plate clutch and through it the direction of rotation of the spindle. An efficient spindle brake is controlled by the same lever. Therefore the following four controls are concentrated in a single lever: Braking of spindle, engagement of pre-selection speed, starting of spindle forward or reverse. Gears for the low or high speed ranges together with the corresponding scales are supplied for the machines to special order. Their exchange is easy to make when the top cover of the spindle head is removed. The gear box is driven by a flange mounted motor controlled by a cross type switch. The types VR 6 and 8 have only partial pre-selection, the type VR 2 has no pre-selection.

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The spindle

The spindle is made of high grade steel and has, after heat treatment, a tensile strength as high as 105 kg per square mm. It is hardened and accurately ground and runs in precision anti-friction bearings. The weight of the spindle is balanced by a counterweight. All gears and shafts are also made of high grade steels and running in anti-friction bearings.

The feed box of the types VR 4 and VR 8 forms an independent unit and is arranged at the right hand side of the central part of the spindle head. It is driven off the spindle. The feed box cover of the types VR 2 and VR 4 carries the speed and feed scales and the feed selector. On the types VR 6 and VR 8 these parts are arranged on the right hand wall of the spindle head above the pole-change switch of the drilling motor.

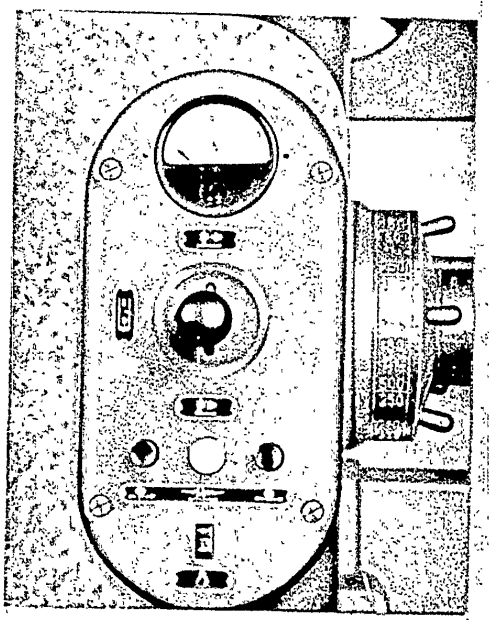
The rates of feed are marked on a scale coupled with the selector.

The following table gives the rates of feed for the various sizes of machines in mm per spindle revolution:

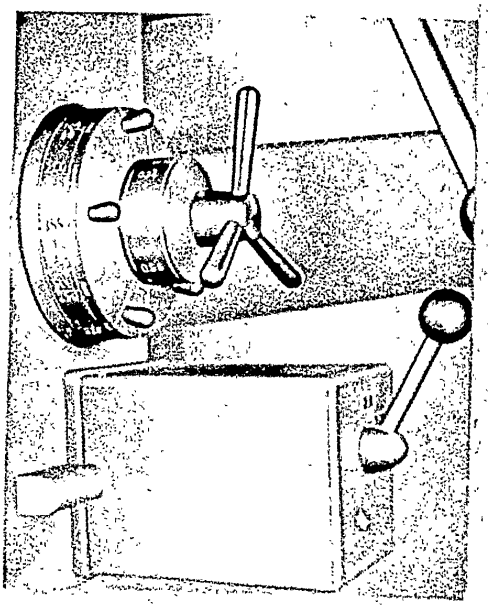
VR 2 0,03-0,05-0,08-0,12-0,19-0,3
VR 4 0,025-0,04-0,06-0,10-0,16-0,25-0,4-0,6-1-1,58
VR 6 0,031-0,05-0,08-0,126-0,2-0,315-0,5-0,8-1,26-2
VR 8 0,035-0,056-0,09-0,14-0,224-0,355-0,56-0,9-1,41-2,24

Apart from the power feed the machines are equipped, for fine hand feed, with a worm gear and a pinion engaging in a gearing on the spindle sleeve and, for coarse hand feed, with a pinion engaging likewise in a gearing on the spindle sleeve. The safety clutch of the feed allows only the maximum permissible power to be transmitted and thus protects the machine from damage. The drilling pressure at which the safety clutch disengages the power feed is adjustable. The clutch is controlled by a lever arranged above the depth scale. This same lever also serves for disengaging the power feed when working to a positive stop. The required depth of drilling is set on a circular scale with a vernier. This arrangement enables the depth of drilling to be set with an accuracy of 0.05 mm (0.002").

The scale of the type VR 4 is provided with 6 movable indicators for various depths of drilling.



Switch Panel on Spindle Head with Cross Type Switch and Ammeter



Scale for Partial Pre-Selection of Spindle Speeds, Feed Engaging Levers and Motor Pole Changing Switch of Type VR 6 Radial Drilling Machine.

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Structural parts of machine

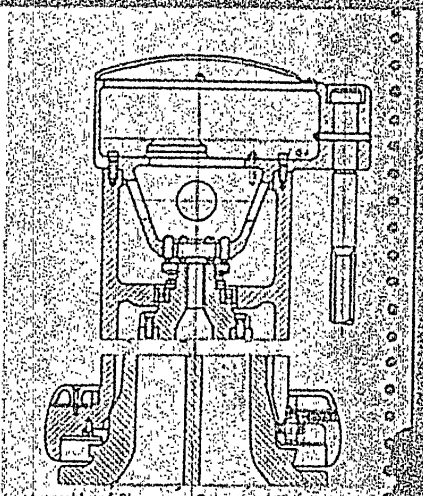
The arm is marked by its outstanding rigidity. Its well chosen shape and well laid out system of reinforcing ribs reduce distortion by twisting and sagging to a minimum in spite of the low weight. The wide guideways for the spindle head are accurately ground. The arm can very easily be rotated by means of a handle attached to its end. The electrical equipment is arranged inside the hollow of the arm.

The sleeve is reinforced by longitudinal and circular ribs and is suspended on the column on a heavy axial ball bearing. It is guided at the bottom by several radial ball bearings on adjustable eccentric pins. These bearings run in a track made of thoroughly heat-treated material. This arrangement results in a lasting high accuracy and easy movement. The surface of the sleeve is accurately ground. The sleeve of the type VR 4 is locked on the column by means of a lever arranged at the right hand side of the spindle head, which simultaneously locks the spindle head in position on the arm. The sleeve of type VR 6 and VR 8 machines is locked on the column by a separate motor arranged in the head of the column and controlled by a push button on the switch panel of the spindle head.

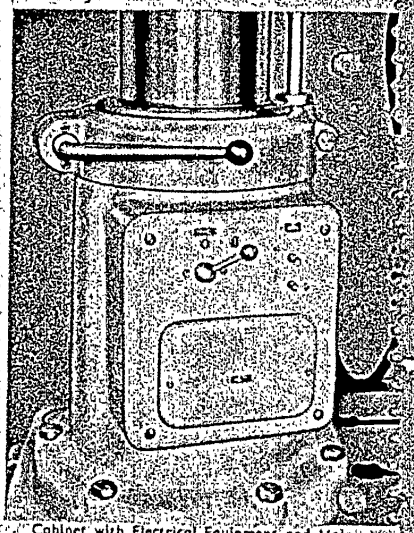
The column is of ample size and well reinforced by cross ribs. It is combined with the base into a single rigid unit being firmly screwed to it by means of a wide flange and forged screws. It guarantees a high degree of rigidity in all working positions of the arm and spindle head.

The mechanism for raising and lowering the arm with the spindle head is driven by a separate electric motor arranged at the rear of the arm. Its power is transmitted by a worm engaging with a worm wheel. The worm wheel is provided with threads and, when turning, moves along the elevating screw and carries the arm with it. The elevating screw does not rotate. The extreme positions of the arm on the column are secured by stops which automatically stop the elevating motor. The stops of the type VR 4 machine may be moved as required. The raising and lowering of the arm is controlled by a cross-type switch on the spindle head the movements of which coincide with the corresponding directions of movement of the arm. The control of the elevation of the arm is interlocked with the arm locking lever. This arrangement protects the machine from damage.

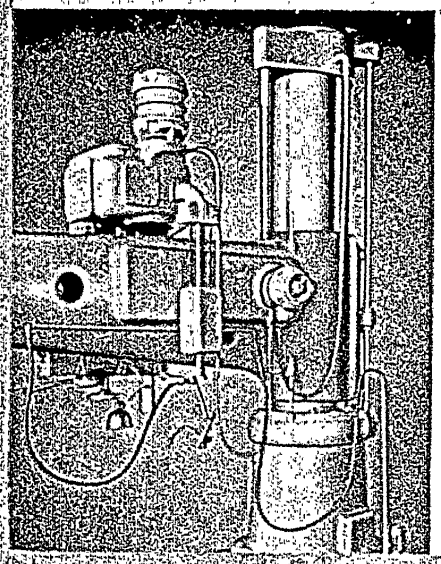
The machines are provided with a securing nut which secures the arm on the column in case the threads of the elevating nut should wear out after a prolonged period of operation. The arm of the type VR 2 and VR 4 machines is locked on the surface of the column by a lever arranged directly on the sleeve of the arm. When the sleeve is locked a special contact opens and stops the elevating motor. The arm of the type VR 6, and VR 8 machines is locked on the column by a motor controlled by a push button on the switch panel of the spindle head.



Assembly of Sleeve on Column of Type VR 6 Drilling Machine.



Cabinet with Electrical Equipment and Main Switch of Type VR 2 Drilling Machine.



Rear View of Type VR 6 Radial Drilling Machine.

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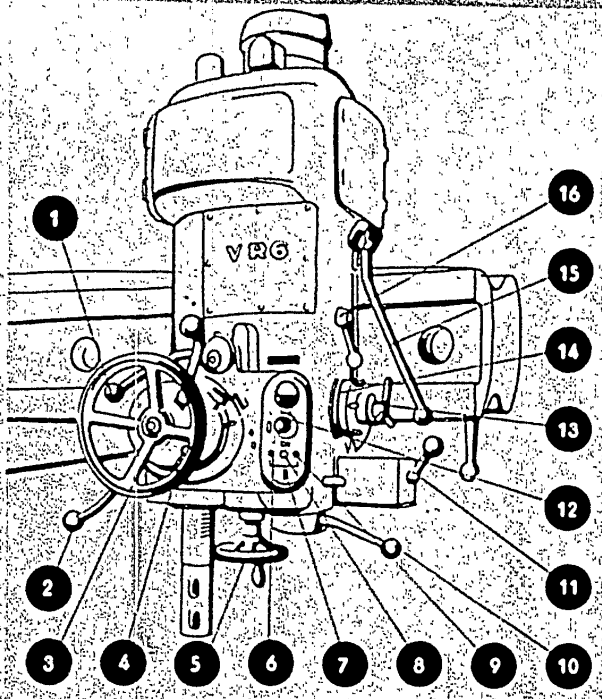
Operation

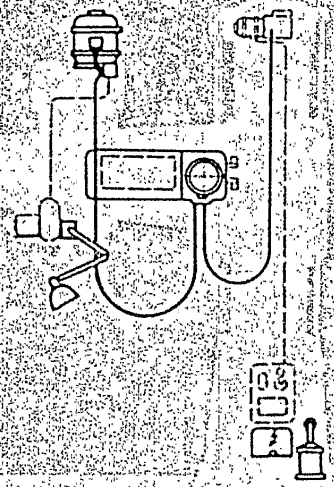
The controls of the machine are conveniently arranged and concentrated on the lower part of the spindle head. This arrangement reduces the time required for setting up the machine to a minimum. The minimum number of controls and the ease with which they are operated make it possible to attain particularly high outputs.

Controls on the spindle head of the type VR 6 radial drilling machine:

1. Lever for engaging clutch of positive stop.
2. Levers for engaging power and hand feed.
3. Hand wheel for setting spindle head.
4. Lever for setting scale to depth of drilling.
5. Wheel for fine hand feed.
6. Push button for unlocking arm and column.
7. Light switch.
8. Signal bulb for locking arm and column.
9. Push button for locking of arm and column.
10. Clutch lever serving also for engagement of preselected speed.



11. Pole changing switch of two-speed motor.
12. Cross-type switch for starting elevating motor and motor for spindle drive.
13. Feed engaging levers.
14. Scale for pre-selection of speeds.
15. Lever for locking the spindle head.
16. Back gear lever.



Electrical Equipment

The machines are supplied with a reliable electrical equipment, easily accessible and well protected against outside influences and damage. It is partly accommodated in the base of the column and partly in a box in the arm. The cross-type switch of the drilling and elevating motor with an ammeter for checking the load, the push-buttons for the locking of the arm and column and the light push-button are arranged on the spindle head to be within easy reach during operation of the machine.

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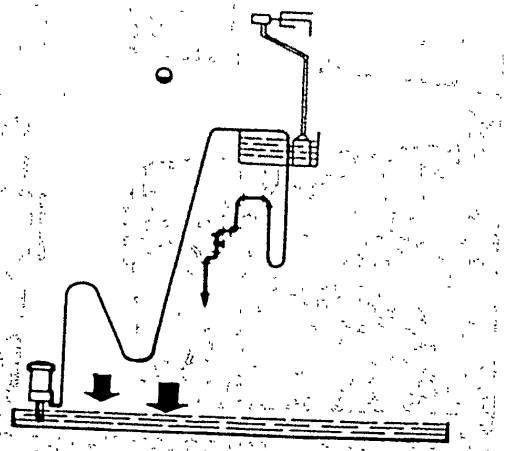

Cooling system

The machines are equipped with a cooling system with an independent centrifugal pump which supplies coolant from a tank formed in the rear part of the base through a pipe line to the tool. From a groove arranged along the edges of the base the coolant returns through a screen, which separates the chips, back into the tank.

Lubrication

All moving parts of the spindle head are lubricated automatically by a stream of oil supplied by an oil pump in the spindle head from a tank arranged in the lower part of the spindle head to the multi-plate clutch shaft from which it is thrown over the clutch plates to the gears. The pump is fitted in such a position that it is accessible without dismantling the spindle head. The pump of all types is driven by the drilling motor so that the pump is started simultaneously with the motor whether the drilling spindle is running or not. The oil level in the spindle head is checked by an oil gauge at the left-hand side, the correct flow of oil is shown by oil flowing from a tube in the oil gauge.

Every machine is tested for precision of manufacture and accuracy of operation. Results of tests are recorded in a test certificate supplied with the machine. In cases of larger types, which are shipped dismantled, the final measurements of accuracy have to be taken after erection of the machine at site. Accuracy tests are carried out by specially trained experts by means of the most modern instruments and equipment.

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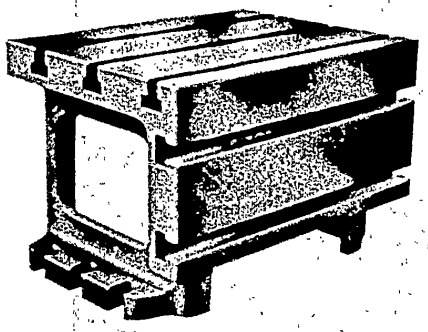
Special Equipment

The following equipment for the machines is supplied at an extra charge to special order:

BOX TYPE DRILLING TABLES:

Designation	Vb 2	Vb 4	Vb 8
Intended for machines type	VR 2	VR 4	VR 6–8
Top working surface . . mm	525 × 400	550 × 550	1010 × 755
inches	21" × 16"	22" × 22"	40" × 30"
Number, width and distance between T-slots . . . mm	3 × 22 × 130	4 × 22 × 130	5 × 28 × 160
inches	3 × 7/8" × 5 1/8"	4 × 7/8" × 5 1/8"	5 × 1 1/16" × 6 1/16"
Side working surface . . mm	525 × 260	550 × 420	1010 × 500
inches	21" × 10"	22" × 16 1/2"	40" × 20"
Number, width and distance between T-slots . . . mm	2 × 22 × 130	3 × 22 × 130	3 × 28 × 160
inches	2 × 7/8" × 5 1/8"	3 × 7/8" × 5 1/8"	3 × 1 1/16" × 6 1/16"
Dimensions of base . . . mm	525 × 351	600 × 526	1060 × 750
inches	21" × 16 1/2"	24" × 21"	42" × 30"
Number width and distance between T slots in base . mm	3 × 27 × 95	3 × 27 × 190	5 × 30 × 125
inches	3 × 1 1/16" × 3 3/4"	3 × 1 1/16" × 7 1/2"	5 × 1 3/16" × 5"
Overall dimensions of table mm	525 × 400 × 400	600 × 550 × 550	1060 × 755 × 500
inches	21" × 16" × 16"	24" × 22" × 22"	42" × 30" × 20"
Weight of Table . . . kg	110	210	410
lbs	245	465	905

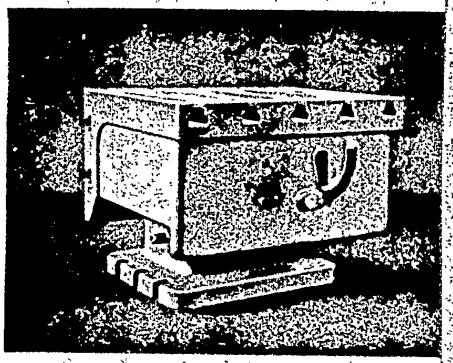


Standard accessories:

Clamping screws with nuts and washers.

UNIVERSAL TABLES:

Designation	Vc 4	Vc 8
Intended for machines type	VR 2–4	VR 6–8
Top working surface . . . . . mm	550 × 550	750 × 600
inches	22" × 22"	30" × 24"
Number, width and distance between T-slots mm	4 × 22 × 130	5 × 28 × 160
inches	4 × 7/8" × 5 1/8"	5 × 1 1/16" × 6 1/16"
Side working surface . . . . . mm	550 × 430	750 × 610
inches	22" × 17"	30" × 16"
Number, width and distance between T slots mm	3 × 22 × 130	2 × 28 × 160
inches	3 1/2 × 5 1/8"	2 × 1 1/16" × 6 1/16"
Dimensions of base . . . . . mm	535 × 600	560 × 460
inches	21" × 24"	22" × 18"
Number, width and distance between T slots in base . . . . . mm	3 × 27 × 190	3 × 30 × 125
inches	3 × 1 1/16" × 7 1/2"	3 × 1 3/16" × 5"
Overall dimensions of table . . . . . mm	730 × 570 × 550	890 × 670 × 550
inches	29" × 22 1/2" × 22"	35" × 24 1/2" × 22"
Range of tilting degrees	0 to 90	0 to 90
Weight of table . . . . . kg	270	420
lbs	595	925

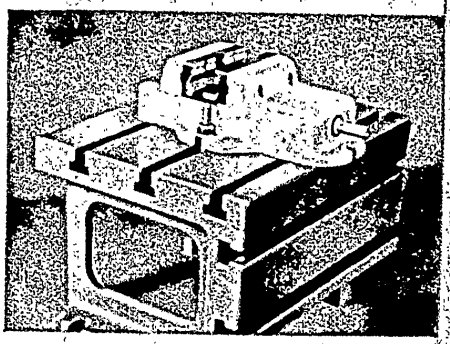


Standard accessories:

Two-armed crank, clamping screws with nuts and washers.

VICE:

Designation	Vd 4
Intended for machines type	VR 2-4-6-8
Maximum opening of jaws . . . . . mm	160
inches	6 1/16"
Width of jaws . . . . . mm	150
inches	5 11/16"
Height of jaws . . . . . mm	50
inches	1 15/16"
Overall dimensions of vice . . . . . mm	383 × 230 × 115
	15 1/16" × 9 1/16" × 4 1/2"
Weight of vice . . . . . kg	26
lbs	57



Standard accessories:

Two-armed crank, clamping screws with nuts and washers

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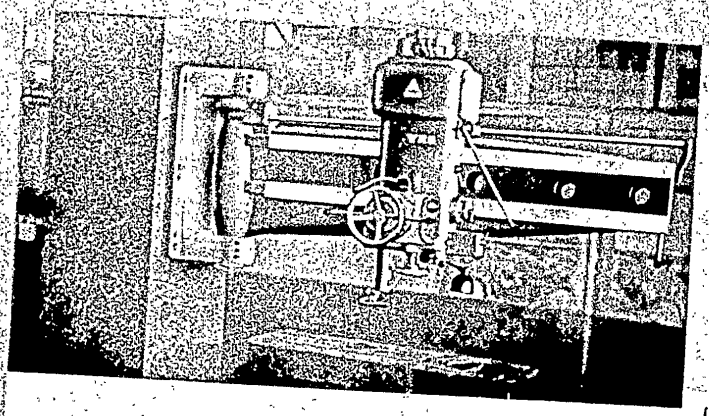
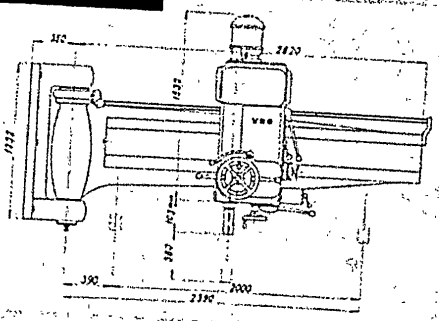


WALL MOUNTED SWIVELLING DRILLING MACHINE

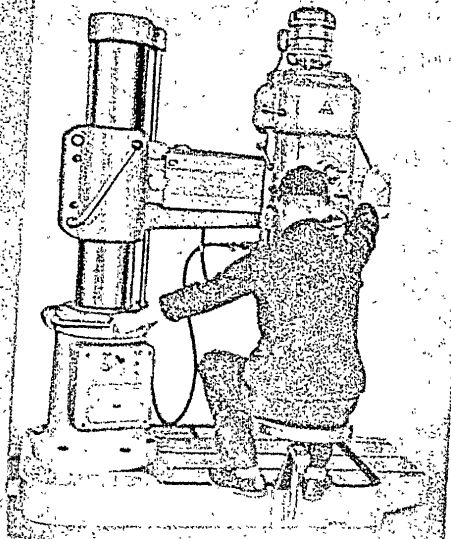
with Type VR 6 Spindle Head



SPECIFICATION:

Minimum radius at extreme position of spindle	mm	390	12"[illegible]
Maximum radius at extreme position of spindle	mm	2390	94"
Swing of arm		180°	
Radius of working area required	mm	2900	
Weight of machine	kg	2550	114" lbs 5620

All other data are identical with those of the type VR 6.



Work on type VR 2 machines is made comfortable by Type Vo 2 seat supplied to special order at an extra charge.

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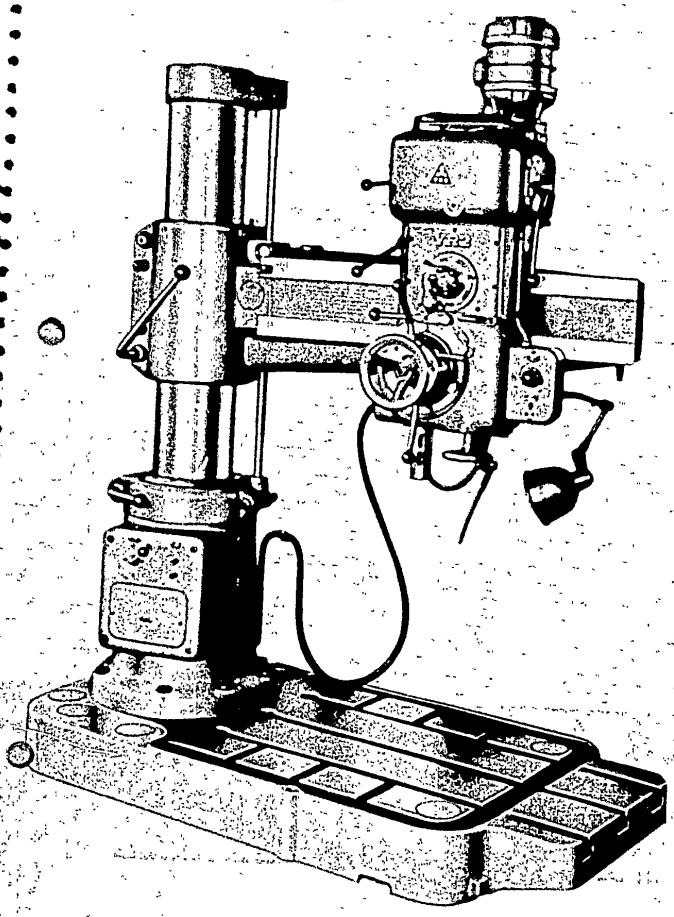
RADIAL DRILLING MACHINE

Model

2



TOS

High output of machine combined with lasting accuracy. ● Rigidity of machine within limits established by taking-over conditions in all working positions ● Simplified and easy operation; small number of conveniently arranged controls concentrated on spindle head ● Arm elevated by power ● Sleeve locked on column by single lever ● Spindle head locked on arm also by single lever ● Control of drilling and elevating motors by single cross-type switch ● Wide range of spindle speeds, 12 in number ● 6 power feeds of the drilling spindle ● 3 different ways of feeding the drilling spindle: coarse by hand, fine by hand, by power ● Attachment for automatic release of the power feed when the required depth of drilling is reached ● Automatic lubrication of the headstock unit by the circulation system.

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SPECIFICATIONS:

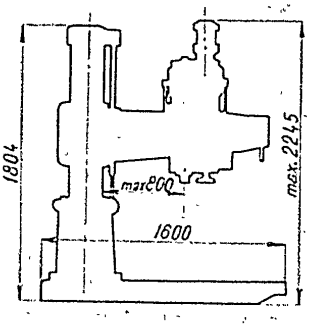
		Metric	English
CAPACITY:			
Maximum diameter when drilling steel having a tensile strength of 60 kg per square mm	mm	25	1"
Maximum diameter when drilling cast iron having a tensile strength of 25 kg per square mm	mm	35	1.3"
Maximum diameter when boring steel having a tensile strength of 60 kg per square mm	mm	50	2"
Maximum diameter when boring cast having tensile strength of 25 kg per square mm	mm	60	2.3"
Maximum size of thread cut in steel having a tensile strength of 60 kg per square mm		M 16	5/8"
Maximum size of thread cut in cast iron having a tensile strength of 25 kg per square mm		M 20	3/4"
MAIN DIMENSIONS:			
Maximum distance, centre-line of spindle to sleeve	mm	800	31.5"
Minimum distance, centre-line of spindle to sleeve	mm	210	8.2"
Maximum pitch circle of drilled holes	mm	910	36"
Minimum pitch circle of drilled holes	mm	340	13.4"
Maximum and minimum distance, spindle to base	mm	1015/265	40"/10.4"
Maximum and minimum distance, spindle to table	mm	615/0	24"/0"
Diameter of column	mm	220	8.6"
Vertical movement of arm on column	mm	530	21"
Horizontal movement of spindle head on arm	mm	590	23"
Swing of arm on column		0° to 360°	
SPINDLE:			
Diameter of end of spindle	mm	55	2,16"
Taper in spindle	Morse	3	3
Diameter of spindle	mm	25	0.98"
Stroke of spindle	mm	225	8.8"
Spindle speeds: Number of steps standard range	r. p. m.	12	12
to special order	r. p. m.	90—4500	90—4500
Spindle feeds: Number	r. p. m.	56—2800	56—2800
range	mm per rev.	6	6
		0.03—0.3	85—850 cuts p. in.
BASE:			
Working surface	mm	850×780	33.5"×30.6"
Number, width and distance of T-slots	mm	3×25×190	3×0.98"×7.45"
DRIVE:			
Drilling motor: output/speed	kW/r. p. m.		3 5/1400
Elevating motor: output/speed	kW/r. p. m.		0.5/1390
Coolant pump motor, output/speed	kW/r. p. m.		0.125/2500
DIMENSIONS AND WEIGHTS:			
Dimensions of base	mm	1600×800	63"×31.5"
Overall dimensions of machine	mm	1600×800×2245	63"×31.5"×88.5"
Working space required	mm	2600×2350×2250	102"×100"×88.5"
Weight of machine with standard equipment	kg	1250	2750 lbs
Weight of machine with packing	kg	1350	2950 lbs
Weight of machine with seaworthy packing	kg	1700	3730 lbs
Dimensions of seaworthy packing	m	2.05×1.05×1.892	80"×41.5"×74"
Volume of seaworthy packing	m³	4.1	145 cu. ft.

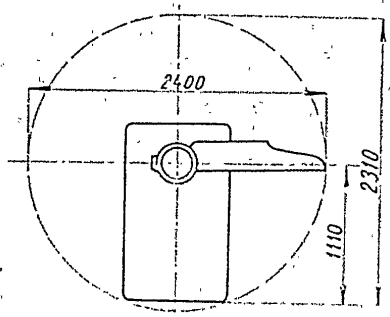
STANDARD EQUIPMENT: electric equipment including electric motors, cooling equipment, 3 reducing sleeves Morse 3/2, 3/1, 1/0, 3 ejecting wedges, set of spanners, oil can, T-slot cleaner, screw driver, 2 grip holders (up to 5 mm dia., 2—10 mm dia.), hooks for lifting of spindle head including bolts, nuts, T-blocks and plugs, instruction book.

SPECIAL EQUIPMENT: 2 change wheels for lower range of spindle speeds 56—2800 r. p. m. style Vs 2, box table style Vb 2, universal table style Vc 4, vice style Vd 4, operator's seat style Vo 2

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.





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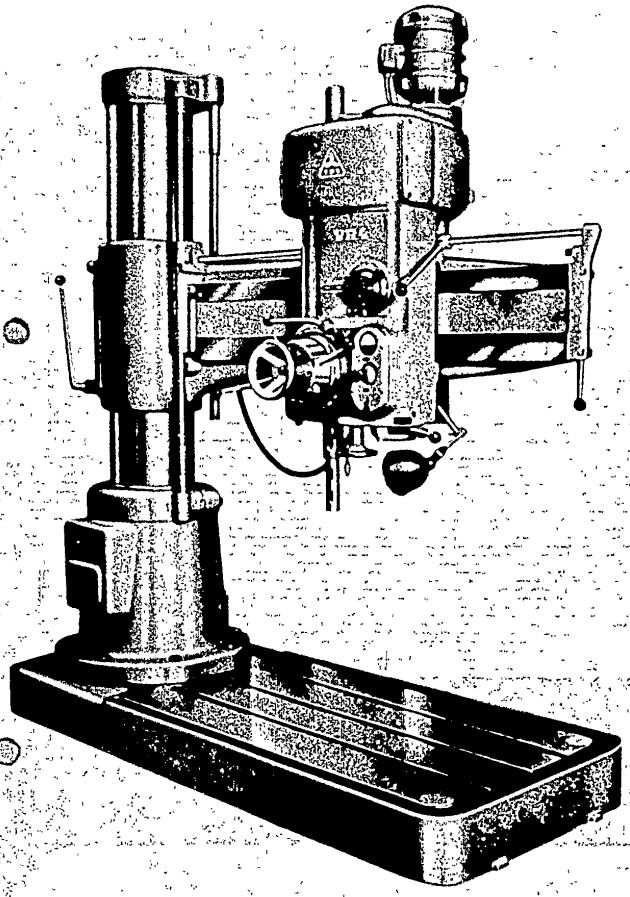
RADIAL DRILLING MACHINE

Model

4



TOS

High output of machine combined with lasting accuracy ● Large working surface and wide range of distances between spindle and base allow big and relatively high pieces to be machined as well as very low ones (drilling of holes in metal sheets) ● Rigidity of machine within limits established by taking-over conditions in all working positions ● Simplified and easy operation; small number of conveniently arranged controls concentrated on spindle head ● Patent guiding arrangement of sleeve by means of ball bearings running in hardened track on column ● Patent positive locking of sleeve on column by means of locking nut ● Sleeve locked on column and spindle head locked on arm by single lever ● Control of drilling and elevating motors by single cross-type switch ● Pre-selection and engagement of drilling spindle speeds and control of two-directional multi-plate clutch by single lever ● Wide range of spindle speeds, 12 in number ● Wide range of power feeds of the drilling spindle, 10 in number ● 3 different ways of feeding the drilling spindle; coarse by hand, fine by hand, by power ● Attachment for automatic release of the power feed when the required depth of drilling is reached ● Automatic lubrication of the headstock unit by the circulation system.

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SPECIFICATIONS:

		Metric	English
CAPACITY:			
Maximum diameter when drilling steel having a tensile strength of 60 kg per square mm	mm	45	1.57"
Maximum diameter when drilling cast iron having a tensile strength of 25 kg per square mm	mm	50	2"
Maximum diameter when boring steel having a tensile strength of 60 kg per square mm	mm	90	3.5"
Maximum diameter when boring cast iron having tensile strength of 25 kg per square mm	mm	100	3.93"
Maximum size of thread cut in steel having a tensile strength of 60 kg per square mm		M 24	1"
Maximum size of thread cut in cast iron having a tensile strength of 25 kg per square mm		M 36	1.5"
MAIN DIMENSIONS:			
Maximum distance, centre line of spindle to sleeve	mm	1255	49"
Minimum distance, centre-line of spindle to sleeve	mm	310	12"
Maximum pitch circle of drilled holes	mm	2830	111"
Minimum pitch circle of drilled holes	mm	935	36.8"
Maximum and minimum distance, spindle to base	mm	1300.760	51"/30.2"
Maximum and minimum distance, spindle to table	mm	750/0	29.5"/0"
Diameter of column	mm	315	12.4"
Vertical movement of arm on column	mm	710	28"
Horizontal movement of spindle head on arm	mm	945	37"
Swing of arm on column		0°—360°	
SPINDLE:			
Diameter of end of spindle	mm	70	2.76"
Taper in spindle	Morse	4	4
Diameter of spindle	mm	35	1.38"
Stroke of spindle	mm	310	12.2"
Spindle speeds: Number of steps		12	12
standard range	r. p. m.	45—2000	
lower range	r. p. m.	31—1400	
increased range	r. p. m.	63—2800	
Spindle feeds: Number		10	10
range	mm per rev.	0.025—1.58	16—1010 cuts p. in.
BASE:			
Working surface	mm	1475×900	57.5"×35.5"
Number, width and distance of T-slots	mm	3×23×190	3×0.98"×7.65"
DRIVE:			
Drilling motor: output/speed	kW/r. p. m.		3/1410
Elevating motor: output/speed	kW/r. p. m.		1.1/1390
Coolant pump motor, output/speed	kW/r. p. m.		0.125/2600
DIMENSIONS AND WEIGHTS:			
Dimensions of base	mm	2240×910	88"×36"
Overall dimensions of machine	mm	2290×910×2865	90"×36"×112"
Working space required	mm	3960×3960×2760	155"×155"×89"
Weight of machine with standard equipment	kg	2550	5600 lbs
Weights of machine with packing	kg	2690	5900 lbs
Weight of machine with seaworthy packing	kg	3320	7300 lbs
Dimensions of sea-worthy packing	m	2.53×2.62×1.17	100"×103"×46"
Volume of seaworthy packing	m³	7.8	266 cu. ft.

STANDARD EQUIPMENT: electric equipment including electric motors, cooling equipment, 3 reducing sleeves Morse 4/3, 3/2, 2/1, ejecting wedges, set of spanners, oil can, T-slot cleaner, screw driver, hooks for lifting including bolts, nuts, T-blocks and plugs, instruction book.

SPECIAL EQUIPMENT: 2 change wheels for lower range of spindle speeds 31—1400 r. p. m. style Ve 4, 2 change wheels for increased range of spindle speeds 63—2800 r. p. m. style Ve 4, box table style Vb 4, univearsl table style Vc 4, vice style Vd 4.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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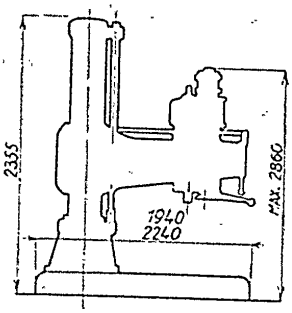

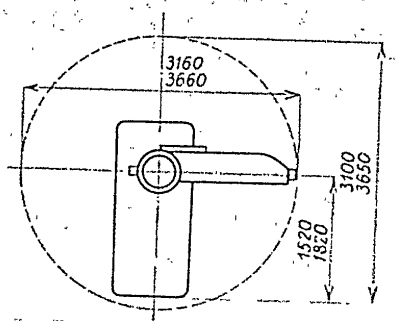

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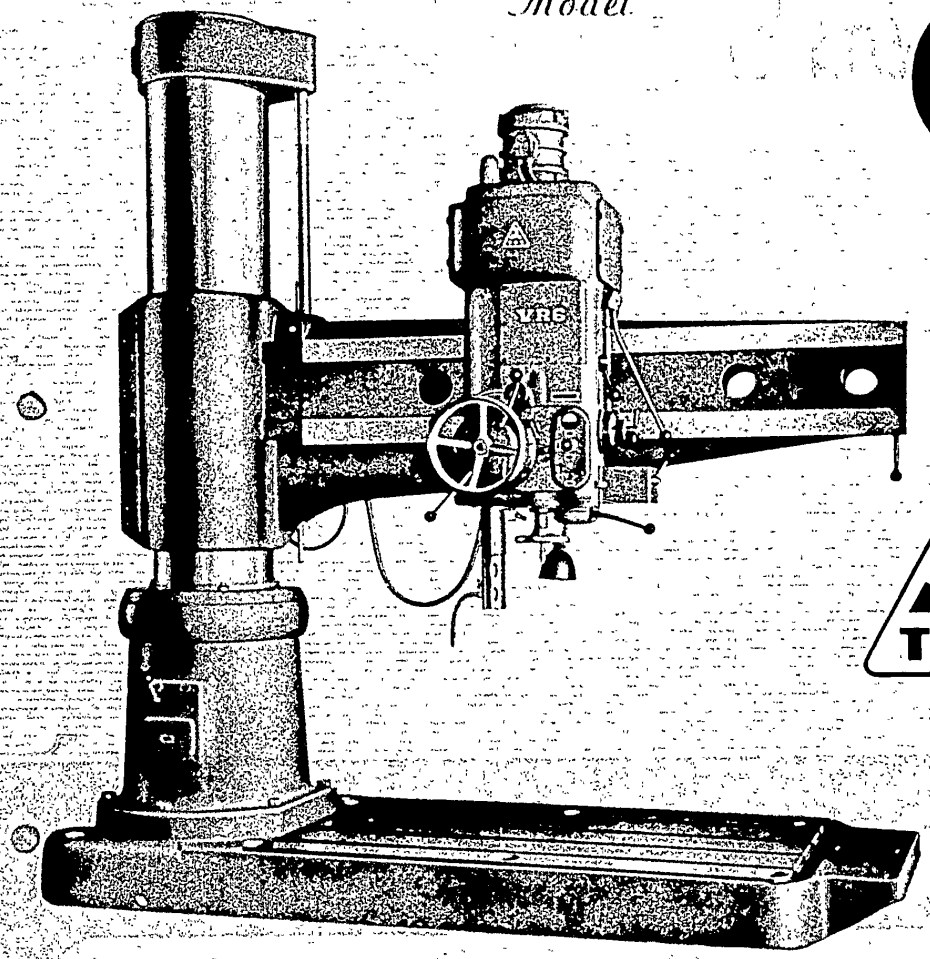
RADIAL DRILLING MACHINE

Model **6**



TOS

High output of machine combined with lasting accuracy ● Large working surface and wide range of distances between spindle and base allow big and relatively high pieces to be machined as well as very low ones (drilling of holes in metal sheets) ● Rigidity of machine within limits established by taking-over conditions in all working positions ● Simplified and easy operation; small number of conveniently arranged controls concentrated on spindle head ● Patent guiding arrangement of sleeve by means of ball bearings running in hardened track on column ● Patent positive securing of arm on column by a nut ● Spindle head locked on arm by a lever ● Arm on sleeve and sleeve on column locked by power ● Control of drilling and elevating motors by single cross-type switch ● Partial pre-selection of spindle speeds ● Wide range of spindle speeds, 12 in number ● Wide range of power feeds of the drilling spindle, 10 in number ● 3 different ways of feeding the drilling spindle: coarse by hand, fine by hand, by power ● Attachment for automatic release of the power feed when the required depth of drilling is reached ● Automatic lubrication of the headstock unit by the circulation system.

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SPECIFICATIONS:

	Metric	English
CAPACITY:		
Maximum diameter when drilling steel having a tensile strength of 60 kg per square mm . . mm	60	2 3/8"
Maximum diameter when drilling cast iron having a tensile strength of 25 kg per square mm . mm	80	3.13"
Maximum diameter when boring steel having a tensile strength of 60 kg per square mm . . mm	300	11.8"
Maximum size of thread cut in steel having a tensile strength of 60 kg per square mm	M 60	2¼"
Maximum size of thread cut in cast iron having a tensile strength of 25 kg per square mm	M 80	3"
MAIN DIMENSIONS:		
Maximum distance, centre-line of spindle to sleeve . . . . . mm	2000	79"
Minimum distance, centre-line of spindle to sleeve . . . . . mm	430	17"
Maximum pitch circle of drilled holes . . . . . mm	4480	176"
Minimum pitch circle of drilled holes . . . . . mm	1340	52.5"
Maximum and minimum distance, spindle to base . . . . . mm	1830/595	72"/23.5"
Maximum and minimum distance, spindle to table . . . . . mm	1330/95	52"/3.7"
Diameter of column . . . . . mm	475	18.6"
Vertical movement of arm on column . . . . . mm	860	34"
Horizontal movement of spindle head on arm . . . . . mm	1570	61.4"
Swing of arm on column	0°—360°	
SPINDLE:		
Diameter of end of spindle . . . . . mm	88	3.45"
Taper in spindle . . . . . Morse	5	5
Diameter of spindle . . . . . mm	45	1.77"
Stroke of spindle . . . . . mm	360	15"
Spindle speeds: Number of steps standard range	12	12
increased range	16—1400	
Spindle feeds: Number r. p. m.	20—1800	
range r. p. m.	10	10
mm per rev.	0.031—2	13—820 cuts p. inch.
BASE:		
Working surface . . . . . mm	1940 × 1080	76" × 42.5"
Number, width and distance of T-slots . . . . . mm	3 × 30 × 250	3 × 1.18" × 9.8"
DRIVE:		
Drilling motor: output/speed . . . . . kW/r. p. m.	5/7/1400/2820	
Elevating motor: output/speed . . . . . kW/r. p. m.	3/1410	
Clamping motor: output/speed . . . . . kW/r. p. m.	0.5/1380	
Coolant pump motor: output/speed . . . . . kW/r. p. m.	0.125/2800	
DIMENSIONS AND WEIGHTS:		
Dimensions of base . . . . . mm	2850 × 1100	112" × 43.5"
Overall dimensions of machine . . . . . mm	3135 × 1100 × 3745	122" × 112" × 147"
Working space required . . . . . mm	5900 × 3960 × 3750	232" × 234" × 147"
Weight of machine with standard equipment . . . . . kg	6400	14 100 lbs
Weight of machine with packing . . . . . kg	6900	15 300 lbs
Weight of machine with seaworthy packing . . . . . kg	7800	17 200 lbs
Dimensions of seaworthy packing	shipped dismantled	
Volume of seaworthy packing . . . . . m³	13.6	480 cu. ft.

STANDARD EQUIPMENT: electric equipment including electric motors, cooling equipment, hooks for lifting of spindle head including bolts, nuts, T-blocks and plugs, 2 reducing sleeves Morse 5/4, 5/3, ejecting wedges, set of spanners, oil can, T-slot cleaner, screw drivers, instruction book.

SPECIAL EQUIPMENT: 2 change wheels for increased range of spindle speeds 20—1800 r. p. m, style Ve 6, box table style Vb 8, universal table style Vc 8, vice style Vd 4

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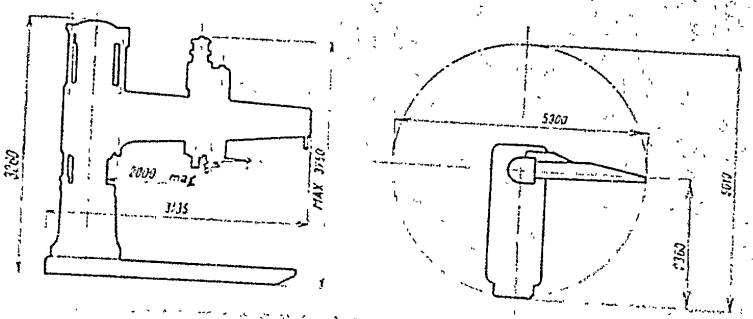

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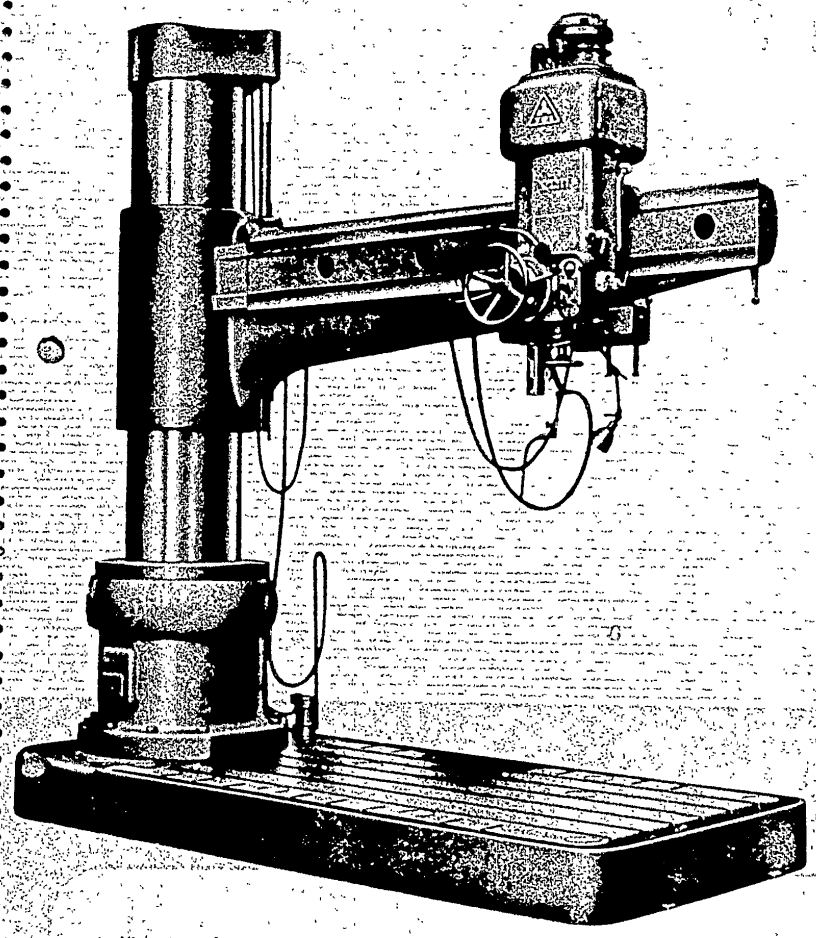
RADIAL DRILLING MACHINE

Model **8**



TOS

High output of machine combined with lasting accuracy ● Large working surface and wide range of distances between spindle and base allow big and relatively high pieces to be machined as well as very low ones (drilling of holes in metal sheets) ● Rigidity of machine within limits established by taking-over conditions in all working positions ● Simplified and easy operation, small number of conveniently arranged controls concentrated on spindle head ● Patent guiding arrangement of sleeve by means of ball bearings running in hardened track on column ● Patent positive securing of arm on column by a nut ● Spindle head locked on arm by a lever ● Arm on sleeve and sleeve on column locked by power ● Control of drilling and elevating motors by single cross-type switch ● Partial pre-selection of spindle speeds ● Wide range of spindle speeds, 12 in number ● Wide range of power feeds of the drilling spindle, 10 in number ● 3 different ways of feeding the drilling spindle: coarse by hand, fine by hand, by power ● Attachment for automatic release of the power feed when the required depth of drilling is reached ● Automatic lubrication of the headstock unit by the circulation system.

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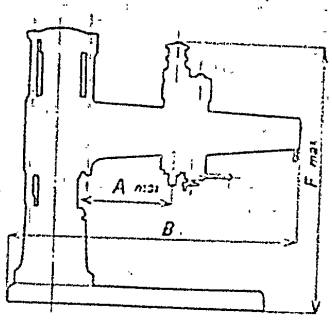
SPECIFICATIONS:

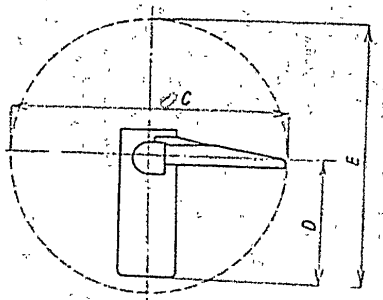
Model	VR 8		VR 83		VR 84	
	Metric	English	Metric	English	Metric	English
CAPACITY:						
Max. dia. when drilling steel having a tensile strength of 60 kg per sq. mm mm	80	3.15"	80	3.15"	80	3.15"
Max. dia. when drilling cast iron having a tensile strength of 25 kg per sq. mm mm	110	4.3"	110	4.3"	110	4.3"
Max. dia. when boring steel having a tensile strength of 60 kg per sq. mm mm	300	11.8"	300	11.8"	300	11.8"
Max. size of thread cut in steel having a tensile strength of 60 kg per sq. mm	M 75	3"	M 75	3"	M 75	3"
Max. size of thread cut in cast having a tensile strength of 25 kg per sq. mm	M 100	4"	M 100	4"	M 100	4"
MAIN DIMENSIONS:						
Max. dist., centre-line of spindle to sleeve mm	2505	99"	3150	122"	4000	156"
Min. dist., centre-line of spindle to sleeve mm	495	19.5"	530	20.8"	530	20.8"
Max. pitch circle of drilled holes . . mm	5560	218"	7240	286"	8940	352"
Min. pitch circle of drilled holes . . mm	1540	60"				
Max. and min. dist., spindle to base . mm	2125/625	83"/24.6"	2832/782	112"/30.5"	2832/782	112"/30.2"
Max. and min. dist., spindle to table . mm	1625/125	64"/4.9"				
Dia. of column . . . . . mm	530	21.8"				
Vertical movement of arm on column mm	1050	41.5"	1600	63"	1600	63"
Horizontal movement of spindle head on arm . . . . . mm	2010	79"	2620	103"	3470	136"
Swing of arm on column . . . . . mm	0°—360°		0°—360°		0°—360°	
SPINDLE:						
Dia. of end of spindle . . . . . mm	102	4"	102	4"	102	4"
Taper in spindle . . . . . Morse	6	6	6	6	6	6
Dia. of spindle . . . . . mm	55	2.15"	55	2.15"	55	2.15"
Stroke of spindle . . . . . mm	450	17.8"	450	17.8"	450	17.8"
Spindle speeds: Number of steps	12	12	12	12	12	12
standard range r. p. m.	11,2—1000		11,2—1000		11,2—1000	
increased range . r. p. m.	16—1400		16—1400		16—1400	
Spindle feed: Number	10	10	10	10	10	10
Range . . mm per. rev.	0,035—2,2	11.6—720 cuts per inch.	0,035—2,2	11.6—720 cuts per inch.	0,035—2,2	11.6—720 cuts per inch.
BASE:						
Working surface . . . . . mm	2360×1360	94"×54"	3235×1780	127"×70"	4085×1780	160"×70"
Number, width and distance of T-slots mm	4×30×250	4×1.18"×9.8"	5×28×160	5×1.1"×6.25"	5×28×160	5×1.1"×6.25"
DRIVE:						
Drilling motor: output/speed kW/r. p. m.	6/7.5/1400/2820		7.5/10/1400/2820		7.5/10/1400/2820	
Elevating motor: output/speed kW/r. p. m.	3/1410		5.5/1430		5.5/1430	
Clamping motor: output/speed kW/r. p. m.	0.36/1380		1 1/1400		1.1/1400	
Coolant pump motor: kW/r. p. m.	0.125/2800		0.215/2800		0.215/2800	
DIMENSIONS AND WEIGHTS						
Dimensions of base . . . . . mm	3475×1400	136"×55"	4300×1800	177"×70"	5350×1800	210"×70"
Overall dimensions of machine . . . mm	3800×1400×4198	150"×136"×165"	4740×1800×5000	186"×70"×197"	5300×1800×5000	208"×70"×197"
Working space required . . . . . mm	7000×7000×4200	275"×275"×165"				
Weight with standard equipment . . kg	9800	21 500 lbs	15 840	35 000 lbs	16 840	37 000 lbs
Weight of machine with packing . . kg	10 200	22 800 lbs				
Weight with seaworthy packing . . kg	10 600	23 500 lbs				
Dimensions of seaworthy packing . .	shipped dismantled					
Volume of seaworthy packing . . . m³	16.5	580 cu. ft.				

STANDARD EQUIPMENT; electric equipment including electric motors, cooling equipment, hooks for lifting including bolts, nuts, T-blocks and plugs, 4 reducing sleeves Morse 6/5, 5/4, 5/3, 4/3, ejecting wedges, set of spanners, oil can, T-slot cleaner, screw drivers, instruction book.

SPECIAL EQUIPMENT; 2 change wheels for increased range of spindle speeds 16 -1400 r. p. m. style Ve 8, box table style Vb 8, universal table style Vc 8, vice style Vd 4.

A	2505	3150	4000
B	2405	3235	4085
C	3475	4740	5300
D	1400	1800	1800
E	3200	4000	4850
F	495	530	530
G	1070	1270	1270
H	3785	4617	4617





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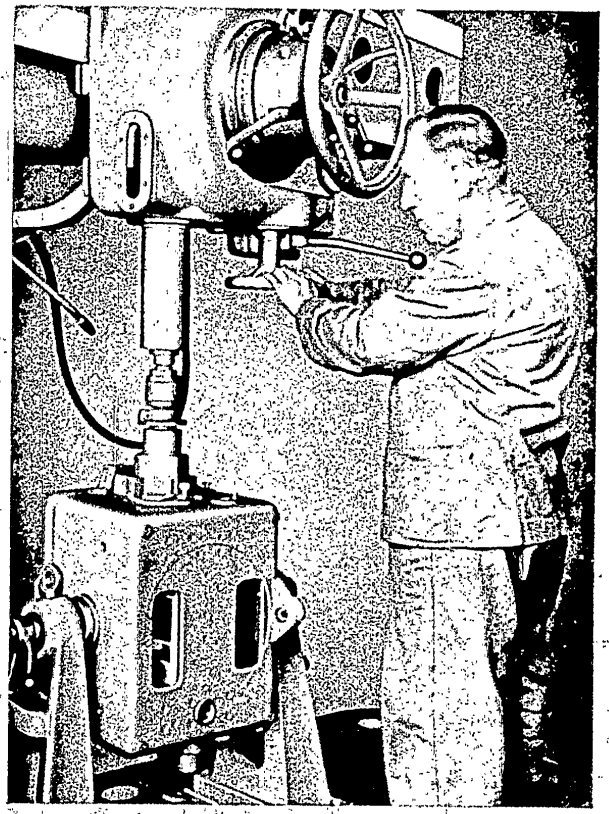

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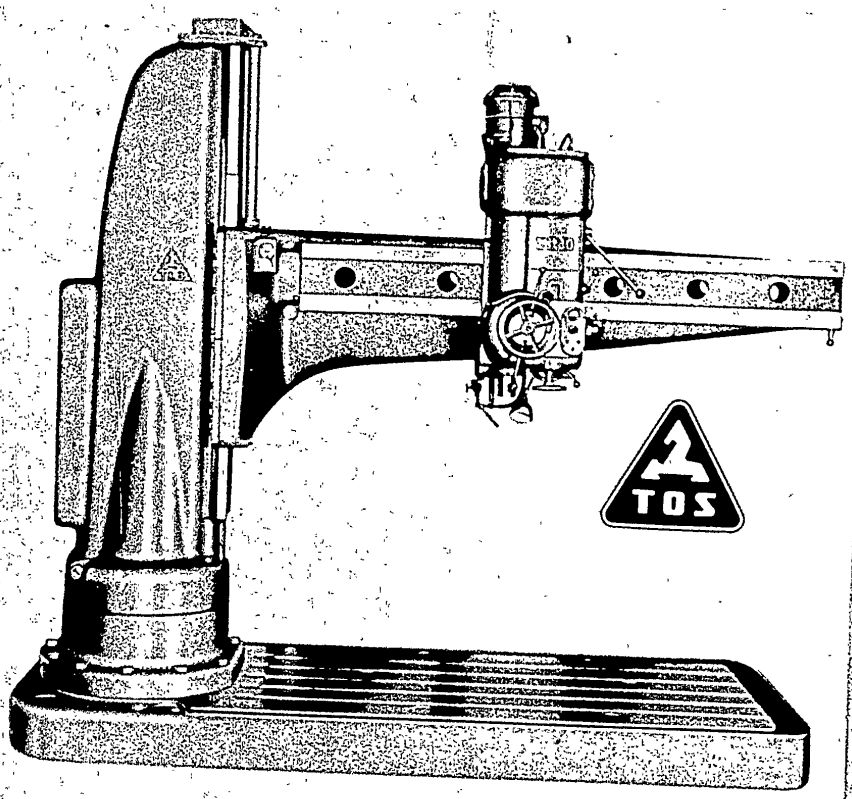

Radial
Drilling
Machines
type

VR 10

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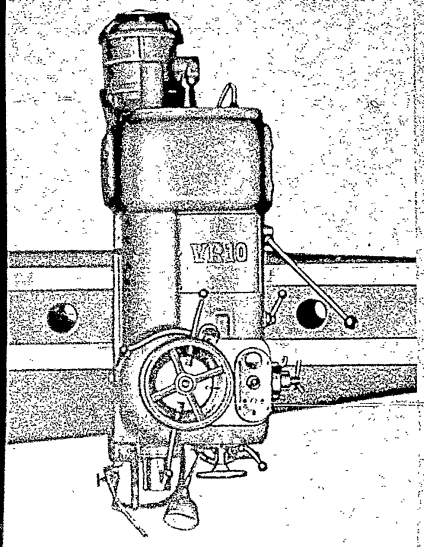

These machines are intended for the drilling and boring of holes and the cutting of threads in big and complicated machinery parts. There are many uses for them in single as well as in quantity production.

The new design of these machines constitutes an improvement in that that the rigidity of the main structural parts has been increased and, as a result, the general precision of the machines improved. The new design consists in the arm being carried on the sleeve on wide prismatic guideways. The advantages achieved thereby are: permanently increased accuracy and easy movement. The machines are built in the following two types:

Type VR 103 with a radius of 3150 mm (10·4")

Type VR 104 with a radius of 4000 mm (13·1")

Outstanding Features:

- High capacity and maintained high accuracy.
- Wide range of spindle speeds arranged in 14 steps of standard range with possibility of changing over to higher range.
- Wide range of power feeds.
- Mechanical elevation of arm.
- Automatic disengagement of power feed when required depth of drilling is reached.
- Handy and concentrated arrangement of controls on spindle head which substantially reduces setting-up times.
- Easy cleaning, lubrication and maintenance of all parts of machine

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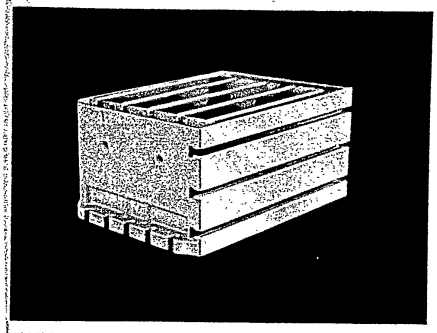
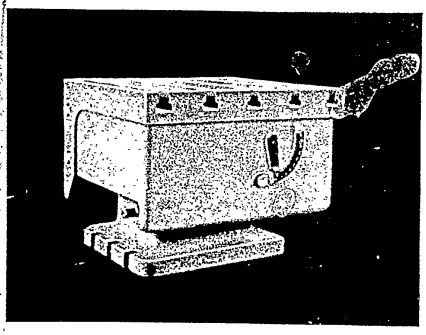


Box type drilling table, type Vh 8:

Top working surface	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots	mm	[illegible]
	inches	[illegible]
Side working surface	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots	mm	[illegible]
	inches	[illegible]
Dimensions of base	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots in base	mm	[illegible]
	inches	[illegible]
Overall dimensions of table	mm	[illegible]
	inches	[illegible]
Weight of table	kg	[illegible]
	lb	[illegible]



Universal drilling table, type Vc 8

Top working surface	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots	mm	[illegible]
	inches	[illegible]
Side working surface	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots	mm	[illegible]
	inches	[illegible]
Dimensions of base	mm	[illegible]
	inches	[illegible]
Number, width and pitch of T-slots in base	mm	[illegible]
	inches	[illegible]
Overall dimensions of table	mm	[illegible]
	inches	[illegible]
Range of tilting	degrees	[illegible]
Weight of table	kg	[illegible]
	lb	[illegible]

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Description:

THE SPINDLE HEAD. The spindle head forms a totally enclosed box. It can be easily moved along the arm by means of a hand-wheel and can be locked in any required position by means of a lever placed at the right hand side of the spindle head.

The gear box of the spindle head has 14 speeds arranged in geometrical progression with a coefficient of 1,41.

Gears for a higher speed range are supplied for the machine on special order. Their exchange is easy to effect when the top cover of the spindle head is removed. The gear box is driven by a flange mounted motor controlled by means of a cross type switch. The machines are equipped with partial preselection.

THE SPINDLE. The spindle runs in precision anti-friction bearings. The weight of the spindle is balanced by a counterweight. The feed box forms an independent unit and is arranged at the right hand side of the central part of the spindle head.

The spindle has a hand feed and a power feed. They are two kinds of hand feed: coarse, by means of hand levers in the power feed head and fine by means of a hand wheel on the lower part of the spindle head.

The safety clutch of the feed allows only the maximum permissible power to be transmitted and thus protects the machine from damage. The clutch is controlled by means of a lever arranged above the depth scale. This same lever also serves for disengaging the power feed when working to a fixed stop. The required depth of drilling is set on a circular scale with a vernier. This arrangement permits the depth of drilling to be set with an accuracy of 0.05 mm (0,002").

STRUCTURAL PARTS OF MACHINE. The arm is marked by its outstanding rigidity. The wide guideways of the spindle head are accurately ground. The sleeve is suspended on the column by means of a sturdy tapered roller bearing. It is guided at the bottom by several radial ball bearings running in hardened bushes on adjustable eccentric pins. This arrangement results in permanent high accuracy and easy movement. The sleeve is locked on the column by means of a separate motor fitted at the bottom of the sleeve and controlled by means of a push button on the switch panel of the spindle head.

The base is provided with T-slots for the clamping of work pieces.

COOLING. The machine is equipped with a cooling system with an independent centrifugal pump which supplies coolant from a tank formed in the rear part of the base through a pipe line to the tool.

LUBRICATION. All moving parts of the spindle head are lubricated automatically by a stream of oil supplied by an oil pump in the spindle head from a tank arranged in the lower part of the spindle head to the multi-plate clutch shaft from which it is thrown over the clutch plates to the gear.

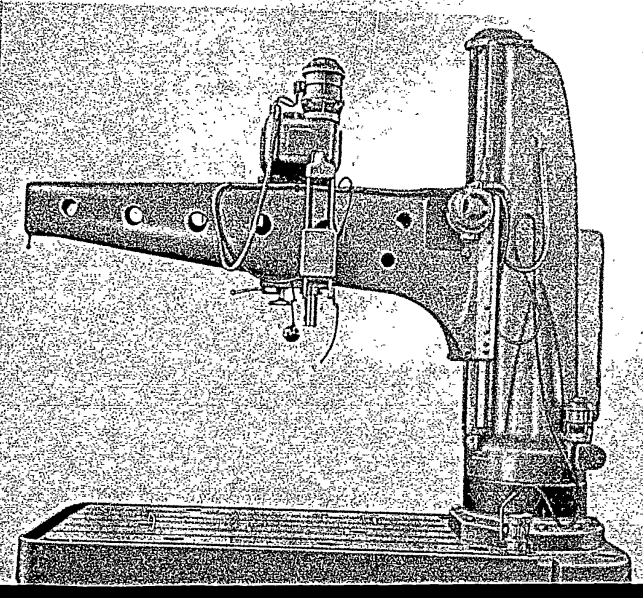
The guideways of the arm on the column and the elevating screw are lubricated by a three piston hand pump provided with a device controlling the quantity of oil supplied to the various points.

Standard Equipment:

Electrical equipment including electric motors, cooling equipment, 2 hooks for lifting the spindle head including bolts and nuts, T-bolts, 4 hooks for lifting the base, a set of Morse taper sleeves sizes 6/5, 5/4, 5/3 and 4/3, a set of taper removing wedges, a set of spanners, an oil can, a T-slot cleaner, 2 screw drivers, an instruction booklet.

Optional Equipment:

2 change gears for higher range of spindle speeds, 1 c. 16 to 1400 r. p. m., type Ve 10, a box type table, type Vb 8, a universal table, type Vc 8, a vice, type Vd 4.



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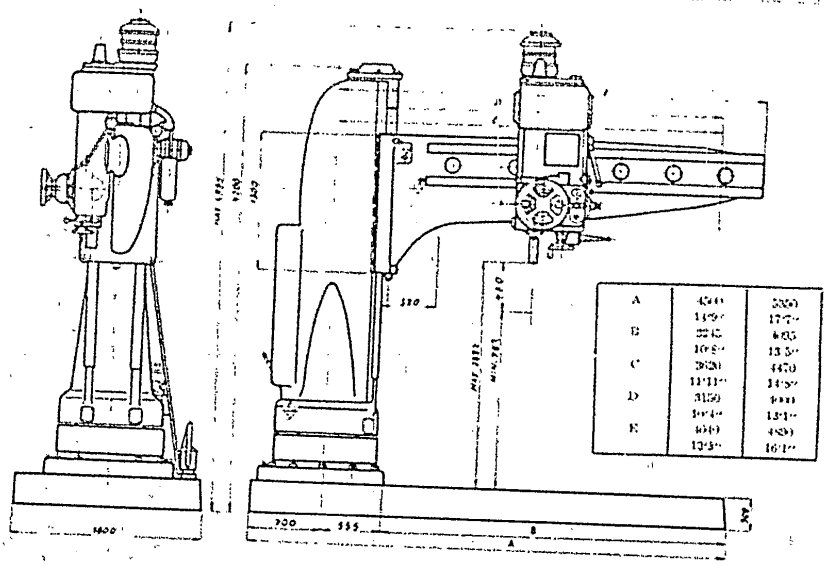

A	4500	5350
	14'9"	17'7"
B	3245	4095
	10'8"	13'5"
C	3620	4470
	11'11"	14'8"
D	3150	4000
	10'4"	13'1"
E	4040	4890
	13'3"	16'1"

Specification:

Type		VR 103	VR 104
Maximum distance from guideway prism to extreme position of spindle	mm	3150 10'4"	4000 13'1"
Minimum distance from guideway prism to spindle	mm	500 1'9"	
Maximum radius in extreme position of spindle	mm	3620 11'10"	4470 14'8"
Maximum and minimum distance from spindle nose to working surface of base*)	mm	2785 710 9'2" 2'4"	
Vertical movement of arm	mm	1600 4'8"	
Travel of spindle head on arm	mm	2620 8'7"	3470 11'3"
Swing of arm on column	mm	500	
Dimensions of base	mm	4500 × 1800	5350 × 1800
Working surface of base	in	14'9" × 15'11"	17'7" × 5'11"
	mm	3255 × 1780	4085 × 1780
Height of base	in	10'7" × 5'10"	13'5" × 5'10"
Number, width and pitch of T-slots of base	mm	300 1"	
Diameter of spindle and spindle nose	mm	5 × 28 × 250 5 × 1 3/32" × 10"	
Taper in spindle	mm	63/110 2 9/16" 4 11/32"	
Lift of spindle		No. 6 Morse	
Number of spindle speeds	mm	475 1'7"	
Speed range, standard		14	
higher	r. p. m.	11.2 to 500 22.5 to 1000	
Number of spindle feeds	r. p. m.	16 to 710 31.5 to 1400	
Range of feeds		10	
Maximum diameter of drilling in steel with tensile strength of 60 kg per sq. mm	mm per rev.	0.066 to 3.54 0.0022" to 0.142"	
Maximum diameter of drilling in cast iron 25 kg per sq. mm tensile	mm	100 4"	
Maximum size of thread cut in steel-cast iron	mm	125 5"	
Maximum diameter of boring in steel with tensile strength of 60 kg per sq. mm	mm	M 1 to M 120 4" 4"	
Drilling motor 1430/2820 r. p. m.	mm	350 14"	
Elevating motor 1420 r. p. m.	kW	9.5 13	
Clamping motor 1400 r. p. m.	kW	5.5	
Coolant pump motor 2800 r. p. m.	kW	1.1	
Overall dimensions of machine	kW	0.125	
	mm	4710 × 1800 5000 5350 × 1800 × 5000	
Weight of machine	in	15'7" × 5'11" × 16'5" 17'8" × 5'11" × 16'5"	
	kg	14500 31400 lbs 16500 36000 lbs	

*) The dimensions in the above sketch are not valid

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

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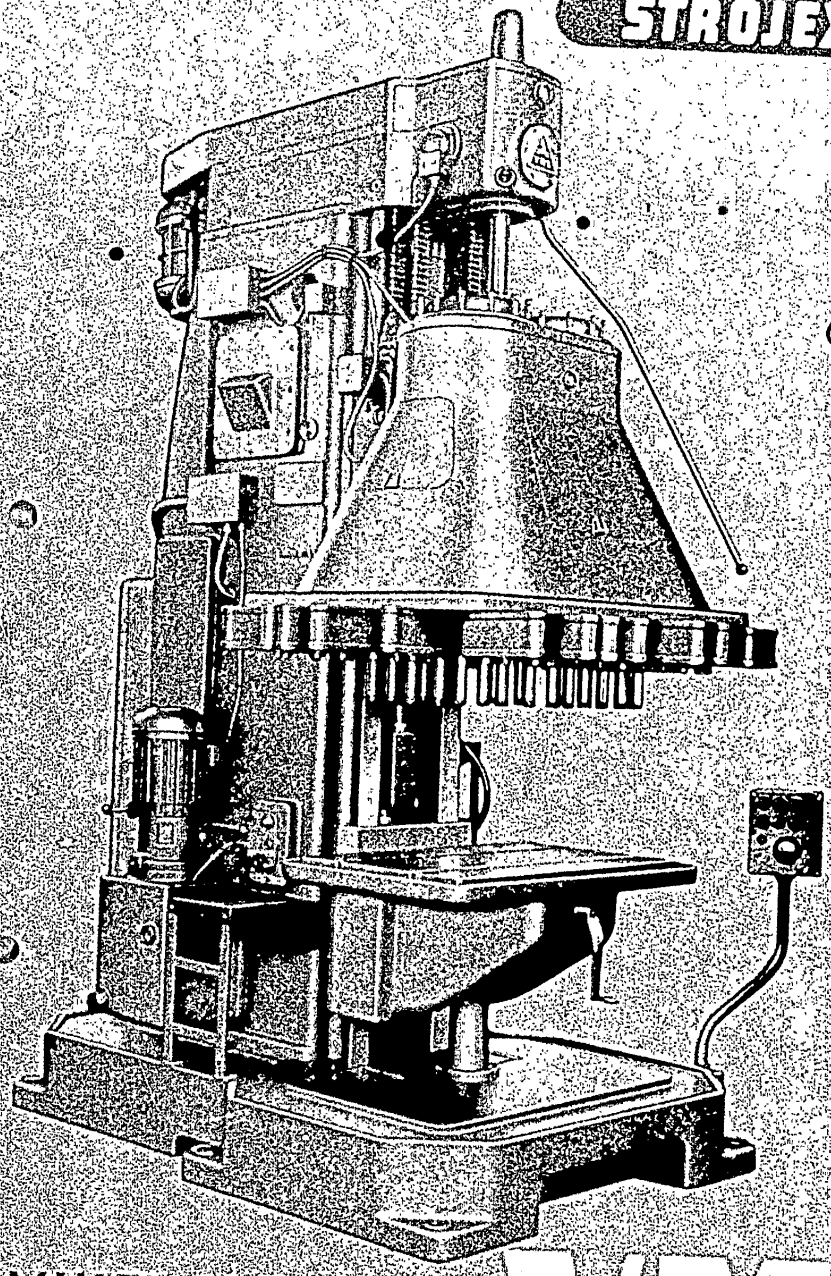

MULTI-SPINDLE DRILLING MACHINE type VM4

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MULTI-SPINDLE DRILLING MACHINE type VM4

The machine is intended for drilling several holes simultaneously in large machinery parts. It is suitable for drilling, countersinking and reaming and also for tapping, if required. The machine can be used for drilling simultaneously as many as 24 holes.
These machines are used to advantage for quantity production as well as for multiple production in large series.

OUTSTANDING FEATURES OF MACHINE

1. Hydraulic working feed and rapid traverse of headstock
2. Possibility of setting suitable speed within wide range
3. Possibility of setting individual spindles over large area
4. Automatic operating cycle
5. Simple setting of machine
6. Easy operation

DESCRIPTION

The machine is outstanding by its high output and a high degree of precision.

The headstock is moved hydraulically along the guideways of the stand and is balanced by a counterweight. The movement of the headstock is 450 mm (17 $\frac{3}{4}$"). The drilling spindles may be set over an area of 560 × 560 mm (22" × 22") The minimum distance between spindles is 38.5 mm (1 $\frac{1}{2}$") The following speeds of the spindles may be set on the machine: 63, 90, 125, 180, 250, 355, 500, 710, 1000 r. p. m. The required speed is obtained by means of two exchangeable belt pulleys, two pairs of sliding gears and three pairs of change gears in the drive box and two pairs of sliding gears on each spindle in the headstock. The drive shafts run in anti-friction bearings. The gears are ground and hardened or scraped.

The body of the machine is moved by hand and locked in the set position

The working table is fastened with the T-slots. The headstock and the bracket move on continuous guideways. On the right hand side of the headstock the hydraulic distribution is fitted, on the left hand side the hydraulic [illegible] front part of the housing there is the hydraulic space, in the rear part the space for [illegible]

The bed plate is designed to form a coolant tank

The gear box is arranged at the top of the housing. The two pairs of sliding gears are moved, with the [illegible] by means of a lever fitted at the right hand side of the box. The change gears are [illegible] The top cover is unscrewed The gear box is driven by the electric motor by means of V belts. The belt pulleys of the electric motor are exchangeable

The hydraulic set consists of two pressure pumps The gear type low pressure pump supplies fluid for the rapid traverse, the high pressure pump for the working feed.

The adjustable drilling spindles are fastened to slots of the headstock. The tools can be moved axially 40 mm (1" $\frac{9}{16}$") by means of sliding insertions This serves for equalizing changes of length of the tool.

The bearings and the gears in the gear box and in the headstock are lubricated by a circulating system.

The guideways of the headstock are lubricated by an electromagnetic press. All other lubricating points are lubricated in the usual manner.

The operating cycles are controlled by adjustable stops fixed to bars of the headstock. The operating cycle is started by means of a push-button station fitted on the right of the machine.

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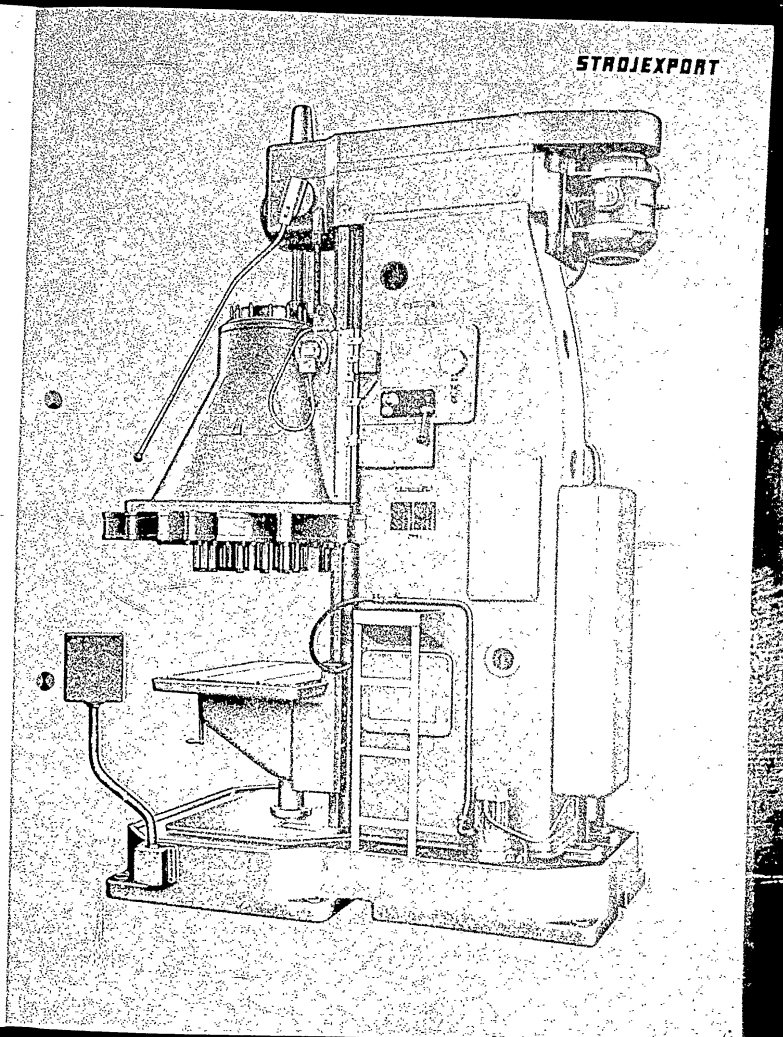

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SPECIFICATION

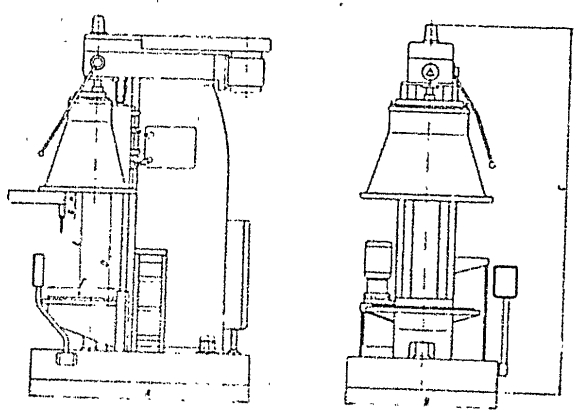
Number of spindels			24	
Diameter of spindles	mm	38		1½"
Thrust of headstock	kg	4000		8800 lbs
Speed of spindles	r. p. m.		63 to 500 125 to 1000	
Vertical movement of headstock	mm	450		17¾"
Drilling area of spindles	mm	560 × 900		22" × 35⅝"
Surface of table	mm	630 × 1000		24¾" × 39⅜"
Feed of headstock, per minute	mm	25 to 250		31/32" to 9⅞"
Motor of drilling head	HP		10	
Motor of hydraulic equipment	HP		2	
Weight of machine	kg	7600		16750 lbs
Weight of machine with seaworthy packing	kg			lbs

OPTIONAL EQUIPMENT

The following equipment can be supplied with the machine at the customer's request:

1. Tapping equipment (must be fitted at manufacturer's works)
2. Depth drilling equipment (must be fitted at manufacturer's works)
3. Plate with fixed spindles - used for large series where spindles need not be reset frequently. The holes in the plate for the mounting of the spindles are to be drilled by the customer in accordance with the part which is to be drilled on the machine.

A	B	C	D min.	D max.	E	F	G	H
2100 83"	1450 57"	3500 137"	1150 45"	1600 63"	1100 43.5"	630 25"	145 5.7"	115 4.5"



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PRAHA - CZECHOSLOVAKIA

ČOK 320408 a - 3310

Printed in Czechoslovakia

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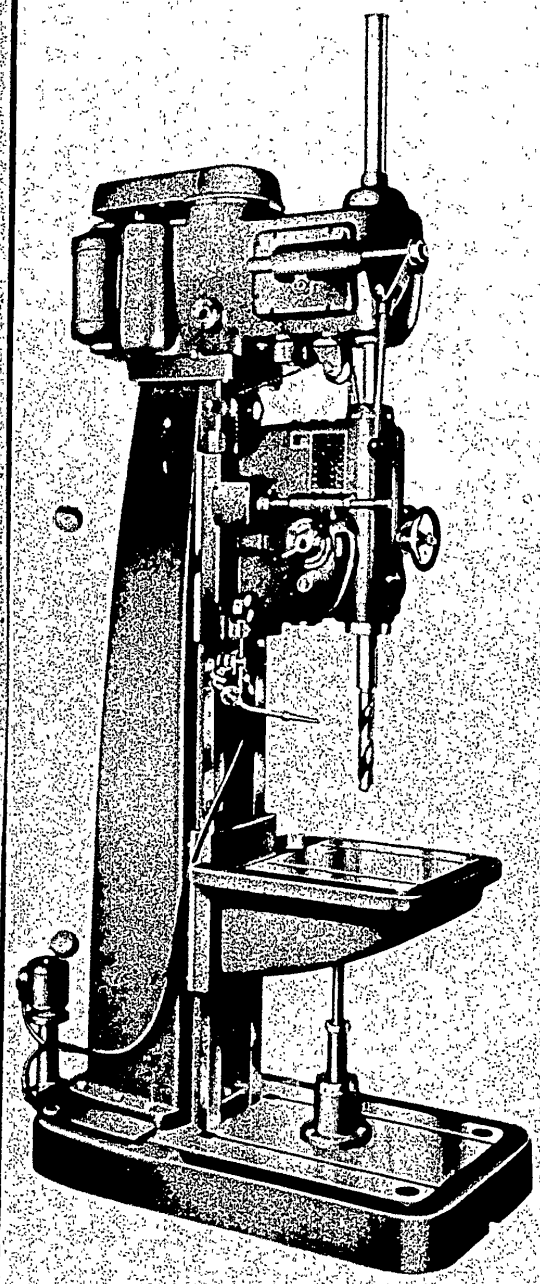

V50

UPRIGHT DRILLS

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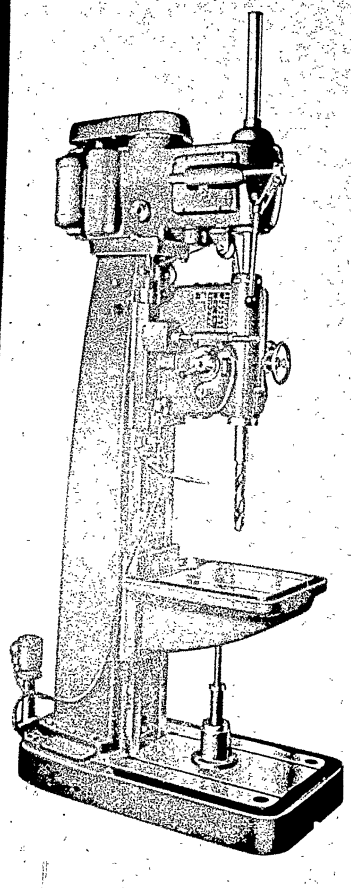


V50

UPRIGHT DRILLS

of this type have the following outstanding features:

- Wide range of spindle speeds.
- Automatic power feed release in either direction of rotation at spindle at pre-set drilling depth.
- Adjustable drilling depth.
- Multi-plate clutch for forward and reverse rotation of spindle.

The Headstock is driven by an electric motor by means of V-belts. Its housing is totally enclosed and contains the gears and the multi-plate clutch for the change of the direction of rotation of the spindle. The spindle speeds are changed by means of a lever on the gear box and by changing over the two-speed electric motor. Another lever controls the multi-plate clutch.

The Headstock Spindle is driven by the splined headstock spindle sleeve. It is mounted in the raising block which travels along the guideways of the column and is balanced by a counterweight. The bore of the spindle nose is provided with a Morse taper.

The Feed Mechanism is housed in the raising block of the spindle. The feed is hand operated or power operated with an automatic release at a pre-set drilling depth. The exact drilling depth is set on a scale. The feeds are changed by two hand levers. The raising block is moved up and down by a hand crank, on the type V 50 also by power.

PLEASE SPECIFY THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS IN YOUR ORDERS FOR MACHINES

DIMENSIONAL DRAWING:

Millimetres:

	a	b	c
V-40	1260	690	2800
V-50	1380	720	3020

Inches:

	a	b	c
V-40	50	27	110
V-50	55	29	119

The Table is square. It is provided with T-slots and with a draining groove for the coolant. The table is moved up and down by a hand crank.

The Column is box shaped and its base plate is provided with T-slots for clamping the work.

The Cooling Equipment: Coolant is supplied by an electrically driven pump from a tank formed in the base plate of the machine.

Standard Equipment: Electric motor 220/380 Volts, 50 cycles, with pole-changing switch, V-belts, belt guards, electric motor driven pump, crank for raising table and feed box, set of spanners.

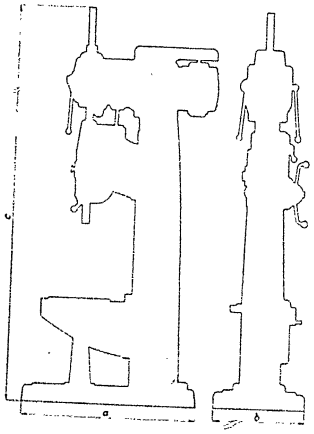
Optional Equipment: Machine vice, 3-jaw chucks with stem, reducing sleeves.

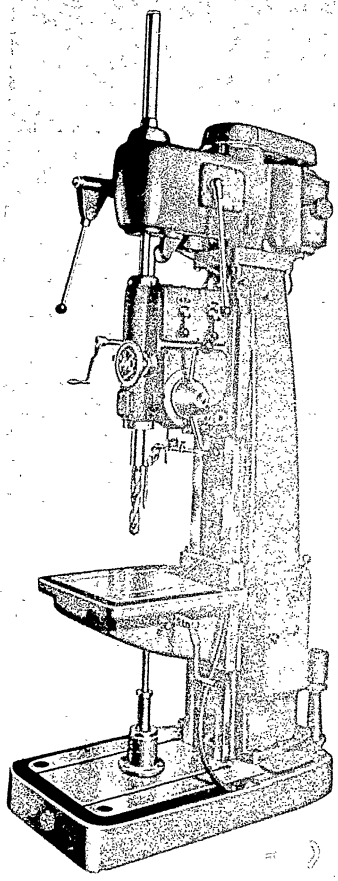
COMPOUND TABLES

SPECIAL DESIGN:

The machine can be supplied, to special order, with a compound table mounted either on the knee or on the base.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.





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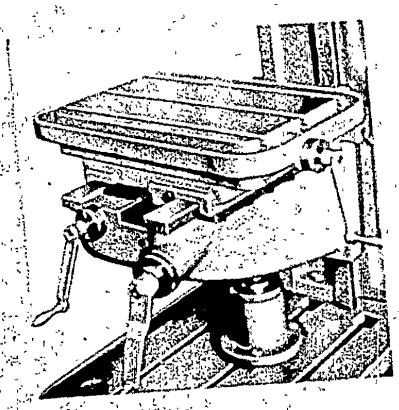
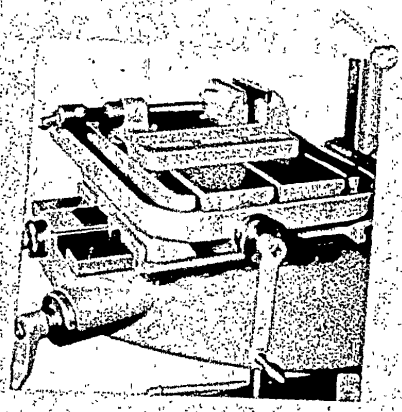
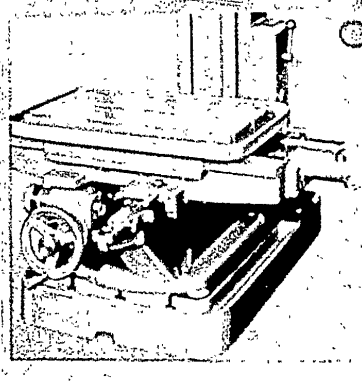
SPECIFICATION

		Metric	
		V-40	V-50
Drilling diameter in steel/in cast iron	mm	40/50	50/60
Drilling depth	mm	240	265
Diameter of spindle	mm	36/42	46/53
Taper in spindle	Morse	4	5
Working surface of table	mm	450×450	500×500
Working surface of base plate	mm	540×660	560×740
Max./min. distance, nose of spindle to working surface of table	mm	650/150	700/235
Max. distance, spindle to base plate	mm	1120	1160
Distance, centre line of spindle to table guideways	mm	375	420
Vertical travel of headstock	mm	300	350
Number of spindle speeds		12	12
Range of spindle speeds	r. p. m.	48 to 950	37 to 760
Number of feeds		4	6
Range of feed per rev.	mm	0.12 to 0.80	0.12 to 1.25
Speed of motor	r. p. m.	1400/2800	1400/2800
Output of motor	HP	3/4	4/5.5
Floor space required	mm	690×1260	720×1380
Weight of machines:			
with standard equipment	kg	1400	1850
shipping, ordinary packing	kg	1500	1970
shipping, seaworthy packing	kg	1740	2270
Volume of crate cu. metres		3,4	4,4
Compound table:			
Working surface of table	mm	350×600	400×700
Max. distance, spindle to working surface of compound table fitted to base plate	mm	680	610
Longitudinal travel of table	mm	400	400
Cross travel of table	mm	300	300

		English	
		V-40	V-50
Drilling diameter in steel/in cast iron		1 5/8"/2"	2"/2 1/4"
Drilling depth		9 1/2"	10 3/8"
Diameter of spindle		1 3/8"/1 5/8"	1 3/4"/2 1/4"
Taper in spindle	morse	4	5
Working surface of table		17 3/4"×17 3/4"	19 3/4"×19 3/4"
Working surface of base plate		20 1/4"×26"	22"×29 1/4"
Max./min. distance, nose of spindle to working surface of table		25 5/8"/5 7/8"	27 1/2"/9 1/4"
Max. distance, spindle to base plate		44"	45 3/4"
Distance, centre line of spindle to table guideways		14 3/4"	16 1/2"
Vertical travel of headstock		11 3/4"	13 3/4"
Number of spindle speeds		12	12
Range of spindle speeds	r. p. m.	48 to 950	37 to 760
Number of feeds		4	6
Range of feed per rev.		.0047" to .031"	.0047" to .049"
Speed of motor	r. p. m.	1400/2800	1400/2800
Output of motor	H. P.	3/4	4/5.5
Floor space required		27"×50"	28"×54"
Weight of machines:			
with standard equipment		3100 lbs	4100 lbs
shipping, ordinary packing		3300 lbs	4300 lbs
shipping, seaworthy packing		3840 lbs	5000 lbs
Volume of crate		120 cu. ft.	155 cu. ft
Compound table:			
Working surface of table		13 3/4"×23 3/8"	15 3/4"×27 1/2"
Max. distance, spindle to working surface of compound table fitted to base plate		26 3/4"	24"
Longitudinal travel of table		15 3/4"	15 3/4"
Cross travel of table		11 3/4"	11 3/4"







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PRAHA • CZECHOSLOVAKIA

COK 50643 a — 5/56 Printed in Czechoslovakia Čzsk.E354 - 1/56/8

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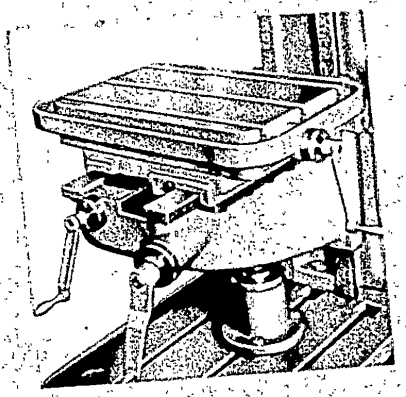
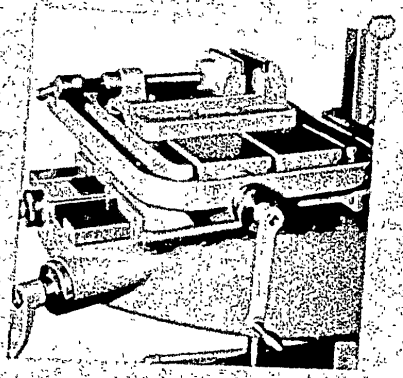
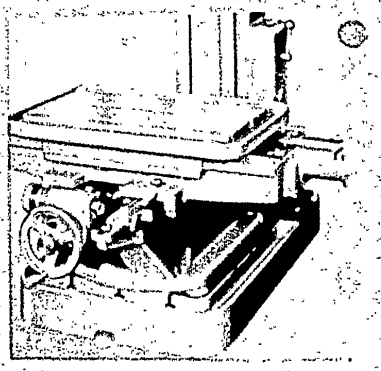
SPECIFICATION

		Metric V-40	Metric V-50
Drilling diameter in steel/in cast iron	mm	40/50	50/60
Drilling depth	mm	240	265
Diameter of spindle	mm	36/42	46/53
Taper in spindle	Morse	4	5
Working surface of table	mm	450×450	500×500
Working surface of base plate	mm	540×660	560×740
Max./min. distance, nose of spindle to working surface of table	mm	650/150	700/235
Max. distance, spindle to base plate	mm	1120	1160
Distance, centre line of spindle to table guideways	mm	375	420
Vertical travel of headstock	mm	300	350
Number of spindle speeds		12	12
Range of spindle speeds	r. p. m.	48 to 950	37 to 760
Number of feeds		4	6
Range of feed per rev.	mm	0.12 to 0.80	0.12 to 1.25
Speed of motor	r. p. m.	1400/2800	1400/2800
Output of motor	HP	3/4	4/5.5
Floor space required	mm	690×1260	720×1380
Weight of machine:			
with standard equipment	kg	1400	1850
shipping, ordinary packing	kg	1500	1970
shipping, seaworthy packing	kg	1740	2270
Volume of crate cu. metres		3,4	4,4
Compound table:			
Working surface of table	mm	350×600	400×700
Max. distance, spindle to working surface of compound table fitted to base plate	mm	680	610
Longitudinal travel of table	mm	400	400
Cross travel of table	mm	300	300

		English V 40	English V-50
Drilling diameter in steel/in cast iron		1 5/8"/2"	2"/2 1/4"
Drilling depth		9 1/2"	10 3/8"
Diameter of spindle		1 3/8"/1 5/8"	1 3/4"/2 1/4"
Taper in spindle	morse	4	5
Working surface of table		17 3/4"×17 3/4"	19 3/4"×19 3/4"
Working surface of base plate		21 1/4"×26"	22"×29 1/4"
Max./min. distance, nose of spindle to working surface of table		25 5/8"/5 7/8"	27 1/2"/9 1/4"
Max. distance, spindle to base plate		44"	45 3/4"
Distance, centre line of spindle to table guideways		14 3/4"	16 1/2"
Vertical travel of headstock		11 3/4"	13 3/4"
Number of spindle speeds		12	12
Range of spindle speeds	r. p. m.	48 to 950	37 to 760
Number of feeds		4	6
Range of feed per rev.		.0047" to .031"	.0047" to .049"
Speed of motor	r. p. m.	1400/2800	1400/2800
Output of motor	H. P.	3/4	4/5.5
Floor space required		27"×50"	28"×54"
Weight of machine:			
with standard equipment		3100 lbs	4100 lbs
shipping, ordinary packing		3300 lbs	4300 lbs
shipping, seaworthy packing		3840 lbs	5000 lbs
Volume of crate		120 cu. ft.	155 cu. ft.
Compound table:			
Working surface of table		13 3/4"×23 5/8"	15 3/4"×27 1/2"
Max. distance, spindle to working surface of compound table fitted to base plate		26 3/4"	24"
Longitudinal travel of table		15 3/4"	15 3/4"
Cross travel of table		11 3/4"	11 3/4"







STROJEXPORT

PRAHA • CZECHOSLOVAKIA

COK 620671 a — 5506 Printed in Czechoslovakia

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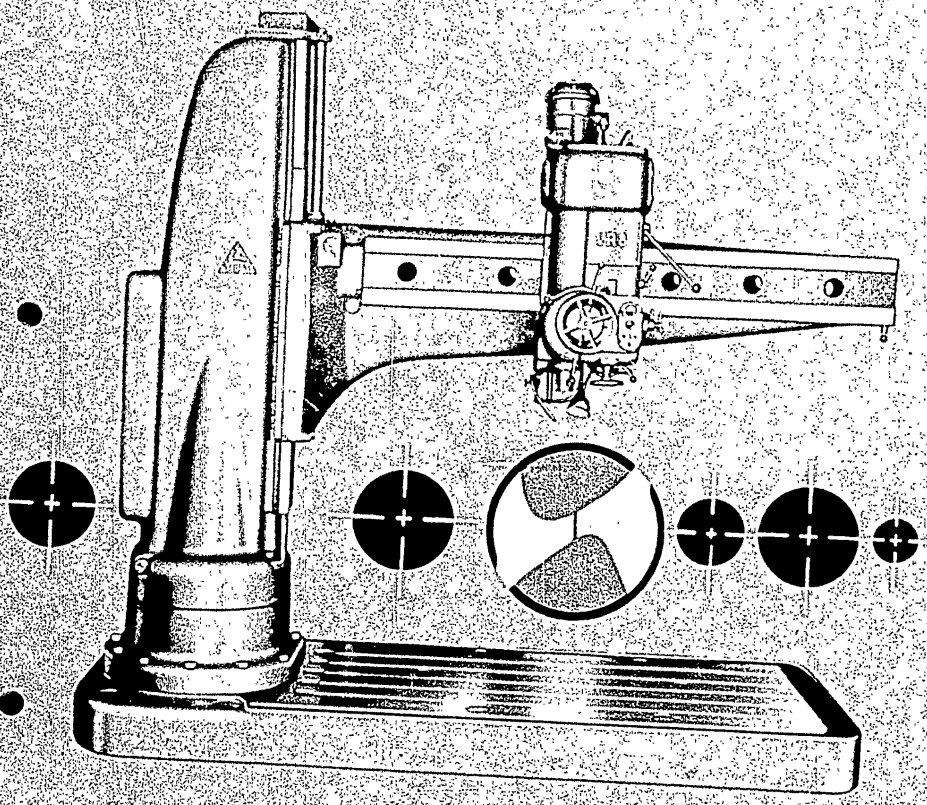

Radial Drilling Machines

VR

83 84 103 104

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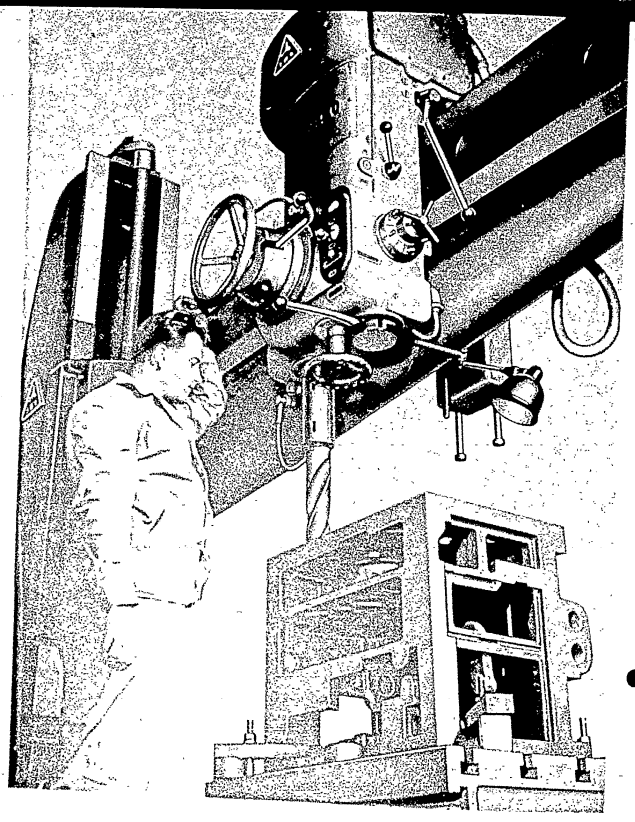

We are placing before you our catalogue of the biggest types of radial drilling machines supplied by us: The VR 83 and VR 84 types with a spindle end diameter of 102 mm (4 1/16") and a useful length of arm of 3150 mm (10 4") and 4000 mm (13 1/4 2") respectively.

The VR 103 and VR 104 types with a spindle end diameter of 110 mm (4 5/16") and a useful length of arm of 3150 mm (10 4") and 4000 mm (13 1/4 2") respectively.

These heavy duty precision machines are intended for drilling and reaming holes, boring and cutting threads in big and complicated machinery parts. In view of the short times required for setting up the machine they [illegible] in many respects horizontal boring machines of suitable fixtures are used.

Outstanding Features

1 High capacity and sustained high accuracy

2 Large clamping surface of base and wide range of distances between spindle and base allowing bulky and relatively high as well as very low parts to be machined or, if required holes to be drilled in rolled plates.

3 Wide range of spindle speeds arranged in 11 steps of standard range with possibility of changing over to higher range.

4 Wide range of power feeds

5 Three different methods of spindle feed, i.e. coarse hand feed, fine hand feed and power feed

6 Mechanical elevation of arm

7 Power locking of sleeve on column

8 Secure locking of arm on column by means of locking nut

9 Automatic disengagement of power feed when required depth of drilling is reached

10 Convenient and centralized arrangement of controls on headstock which [illegible] setting-up times.

11 Automatic splash lubrication of headstock

12 Adequate rigidity of machine within limits of taking-over conditions

13 Precision workmanship and choice of suitable materials ensuring long life of machine

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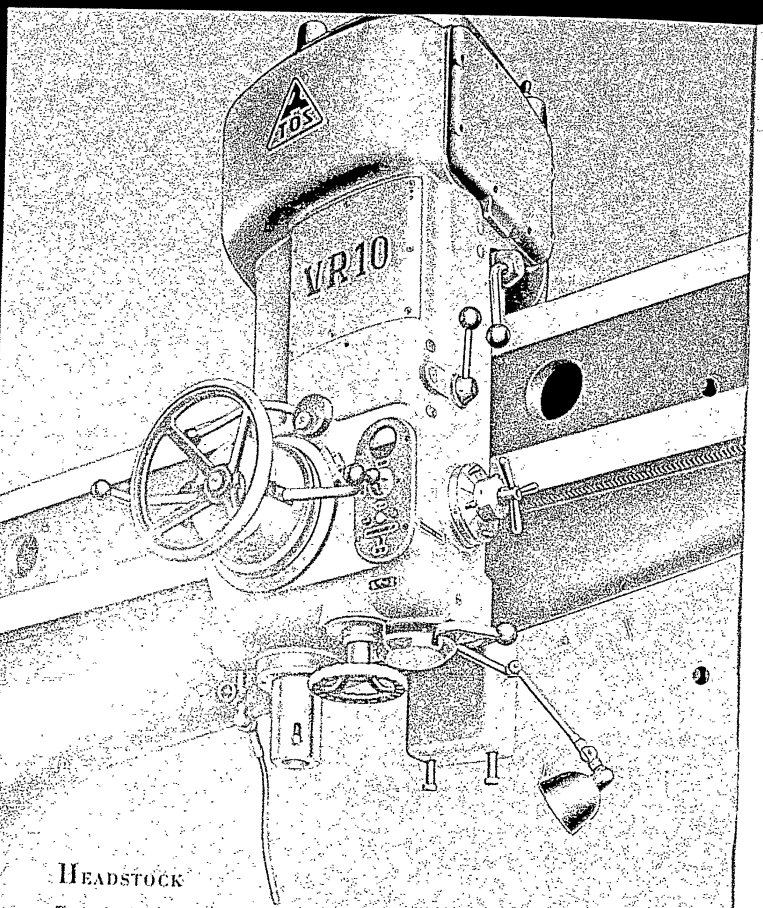


Headstock

The headstock forms a totally enclosed box the shape of which has been so chosen that distortion of any kind has been prevented and a lasting accuracy of mounting of all shafts ensured. When the side covers are removed all the mechanisms of the headstock are easily accessible. The headstock is easily moved along the arm by turning a hand wheel and it can be locked in the set position by means of a lever at the right hand side of the headstock.

The twelve speeds of the gear box, which are arranged in geometrical progression with a quotient of 1.41, can be changed at a ratio of 1 : 2 since a two-speed motor is used. Thus a total of 14 speeds is obtained. The change-over of the motor is done, on the type VR 8, by means of the lever of the change-over switch mounted on the right hand side of the headstock, on the type VR 10 by means of the lever of the cross switch mounted on the control panel of the headstock.

This range of 14 speeds can be changed, by a pair of change gears, at a ratio of 1.41 : 1 to the higher range. The speed ranges are listed in the table below.

STANDARD RANGE

11.2 — 16 — 22.5 — 31.5 — 45 — 63 — 90 — 125 — 180 — 250 — 355 — 500
22.5 — 31.5 — 45 — 63 — 90 — 125 — 180 — 250 — 355 — 500 — 710 — 1000 r. p. m.

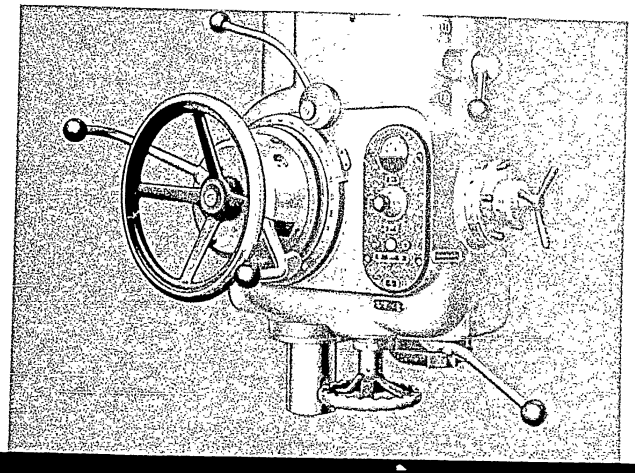
HIGHER RANGE

16 — 22.5 — 31.5 — 45 — 63 — 90 — 125 — 180 — 250 — 355 — 500 — 710
31.5 — 45 — 63 — 90 — 125 — 180 — 250 — 355 — 500 — 710 — 1000 — 1400 r. p. m.

The spindle speeds of both sizes of drilling machines are changed with the machine at rest by means of a scale for partial pre-selection and a control lever of the 1 : 8 sliding gear. Both are mounted at the right hand side of the headstock. The engagement proper of the pre-selected speed is done by moving the speed change lever at the bottom of the headstock downward in its centre position.

A horizontal movement of the speed change lever controls a double multi-plate clutch engaging the right hand (clockwise) and left hand (counter-clockwise) rotation of the spindle. (Counter-clockwise rotation is used, for instance, for dressing from below.) Simultaneously an efficient multiplate brake is controlled for both directions of rotation. Thus the speed change lever combines the following duties: engagement of pre-selected spindle speed, starting of spindle clockwise or counter-clockwise, and braking of spindle.

Change gears with the appropriate scales for the higher speed range are supplied for the machines against extra charge. They are easy to change when the top cover of the headstock is removed.



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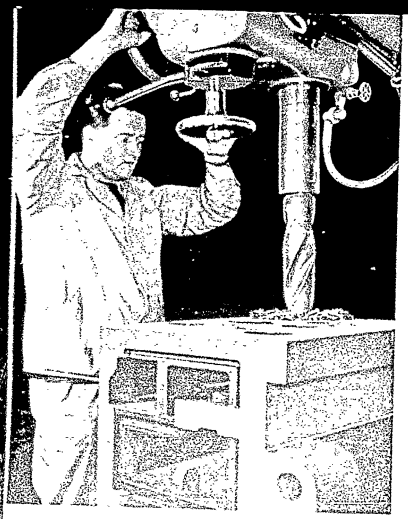


THE SPINDLE

is made of high grade steel and has a tensile strength, after heat treatment, of 105 kg per sq.mm (66.7 tons per sq.inch). It is hardened, accurately ground and mounted in precision anti-friction bearings. The weight of the spindle is balanced by a counterweight. All gears and shafts are likewise made of high grade structural steel and mounted in anti-friction bearings.

The feed box forms an independent unit and is fitted in the centre part of the headstock at the right hand side. Its drive is taken off the spindle.

The speeds and rates of feed are marked on scales at the right hand side of the headstock. The partial pre-selection and engagement of feeds are controlled by levers

[illegible] the table below.

VR [illegible]

[illegible] 0.09 0.14 0.224 0.355 - 0.56 - 0.9 — 1.41 — 2.24 mm
[illegible] 0.0035 0.0056 0.009 - 0.014 - 0.022 - 0.036 - - 0.056 - 0.090 inches

VR 10

[illegible] - 0.09 0.14 0.224 - 0.355 - 0.56 - 0.9 - - 1.41 — 2.24 — 3.54 mms
[illegible] 0.0035 0.0056 0.009 0.014 0.022 - 0.036 - - 0.056 - 0.09 - - 0.14 inches

The [illegible] apart from a power feed of the spindle, also with a hand feed, both coarse and fine.

The fine hand feed of the spindle is obtained by turning the hand wheel and it operates by means of a worm [illegible] which engages with the gearing of the spindle sleeve. When the fine hand feed is to be operated the pair of hand levers must be in their forward position and the lever of the safety clutch in its upper position.

The coarse hand feed is obtained by rotating the pair of levers in their depressed position. The spindle is then moved quickly by direct engagement of the pinion with the gearing of the spindle sleeve.

The safety clutch of the feed allows the maximum permissible power to be transmitted and thus protects the machine from damage. The drilling pressure at which the safety clutch disengages is adjustable. The clutch is operated by a lever which is mounted above the depth scale. When the positive stop is reached the safety clutch disengages and the lever of the safety clutch moves to its upper position.

The depth of drilling can be set on a scale with a vernier with an accuracy of 0.05 mm (0.002").

CONTROLS OF HEADSTOCK

1 Lever for engaging clutch of positive stop.

2 Hand and power feed engaging levers.

3 Hand wheel for travel of headstock

4 Lever for setting scale to required depth of drilling.

5 Hand wheel for fine hand feed

6 Push-button for locking arm and column

7 Light switch.

8 Light signalling locking of arm and column

9 Push button for unlocking arm and column

10 Clutch lever serving also for engagement of pre-selected speed.

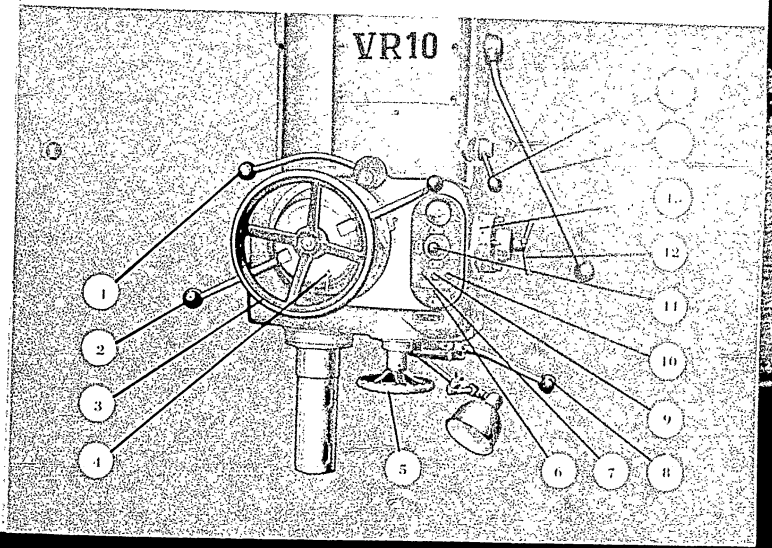
11 Cross switch for starting elevating motor and spindle driving motor.

12 Feed engaging lever

13 Scale for pre-selection of feeds.

14 Headstock locking lever.

15 Sliding gear lever.



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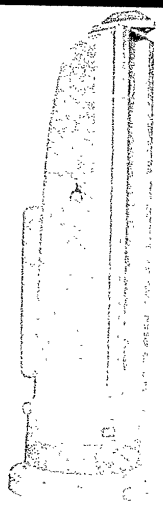
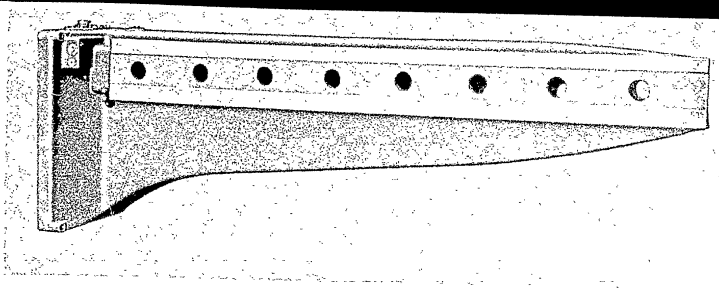


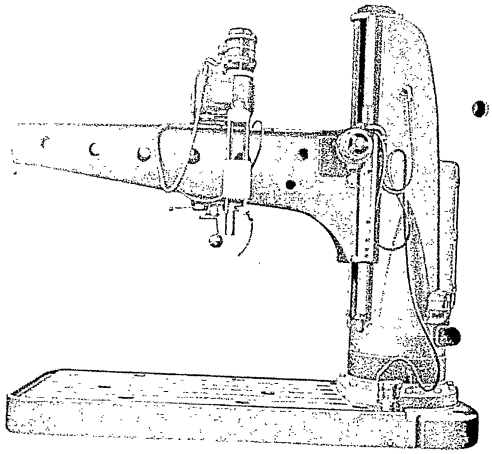
THE STRUCTURAL PARTS

The new design of the sleeve which is box shaped with flat, accurately ground guideways of the arm, results in a reduction of weight of the drilling machines although the same rigidity is maintained

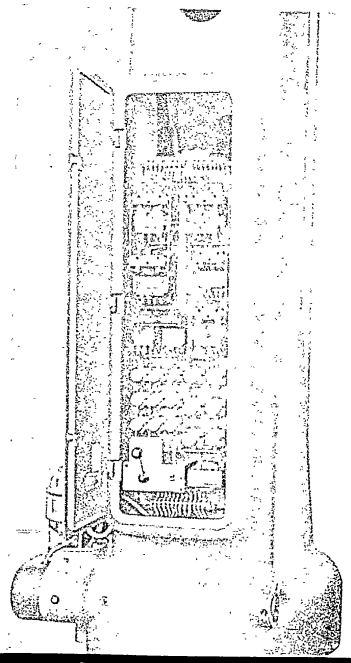
A favourable shape and correct stiffening with ribs at a low weight eliminate twisting and sagging of the arm to a minimum. The arm of the type VR 104 which is of particularly impressive size, is rectangular in cross section and its distortion when a hole 100 mm (3 15/16") in diameter is drilled in solid metal of a tensile strength of 60 kg per sq mm (38 tons per sq inch), is far below the permissible errors



The wide guideways of the arm are accurately ground The headstock is moved along the arm to the point of work by means of a hand wheel. The arm is easy to swivel to the required position. The electric wiring is arranged in the hollow space inside the box shaped sleeve.



The sleeve is locked on the column by an improved locking assembly with an independent electric motor fitted at the bottom of the sleeve The locking can be so adjusted that the movement of the spindle from the set position caused by locking amounts to only some hundredths of a mm. The locking motor is controlled from the control panel on the headstock The sleeve is suspended on the column on a sturdy thrust ball bearing. At the bottom it is guided on adjustable eccentric pins by several radial ball bearings The bearings run on a mechanically hardened track of the column This arrangement results in a lasting high accuracy and easy movement.



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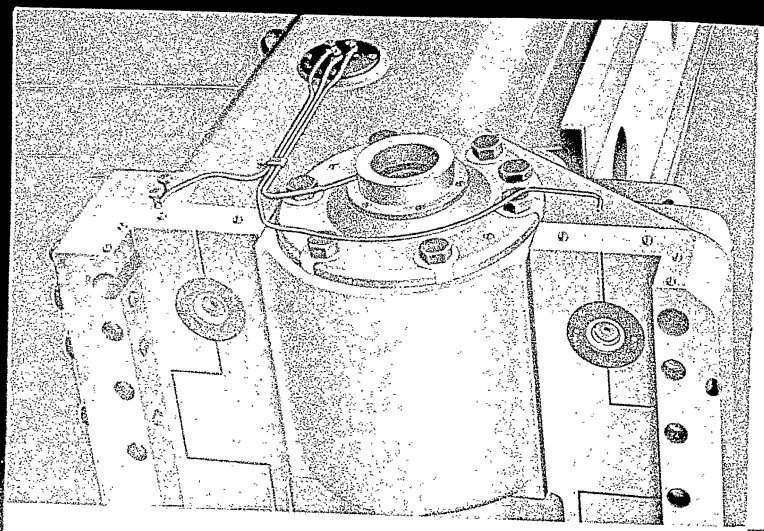


The elevating screw and guide-ways of the arm are lubricated by a hand pump on the front side of the arm. Oil is supplied to the lubricating points by pipes.

The extreme positions of the arms are safeguarded by switches which cut off the power to the elevating motor, the arm is elevated and lowered by means of a cross switch on the headstock, the movements of which correspond to the directions of the movements they control.

The machines are equipped with a safety nut which secures the arm on the sleeve against [illegible] the threads of the elevating nut should be worn after a long period of operation.

When the arm has stopped the play in the guide-ways is eliminated automatically by [illegible] which rest against the guideways of the sleeve.

Electrical Equipment

The machines are fitted with reliable electrical equipment which is easily accessible and well protected [illegible] outside influences and damage.

The electrical equipment is accommodated in a box inside the arm. The cross switch of the drilling and [illegible] ing motors with the ammeter for the checking of the load, the push-buttons for the locking of the arm [illegible] sleeve and the light switch are fitted to the control panel on the headstock in order to be [illegible] during operation of the machine.

Cooling

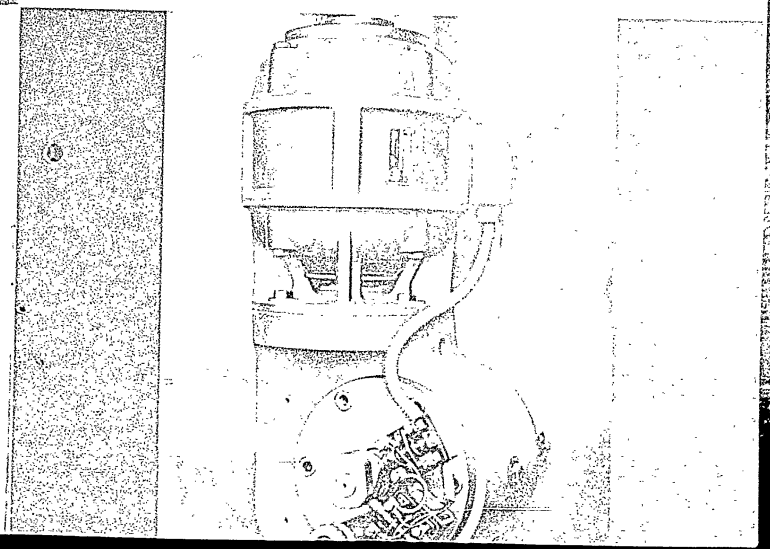
The machines are equipped with a cooling equipment with an independent [illegible] coolant from a tank formed in the rear part of the base through a pipe line [illegible]

The [illegible] of [illegible] dimensions and provided with reinforcing ribs. It is firmly bolted together with [illegible] forged bolts into one solid unit which ensures an adequate rigidity of the machine in all working positions of the arm as well as of the headstock.

The box shaped base is generously stiffened with ribs. A sufficient height ensures the rigidity of the whole base which is attached by foundation bolts to a concrete foundation and grouted with cement. The clamping surface of the base is smooth machined and provided with T-slots for the clamping of workpieces, fixtures or a table.

The elevating mechanism is accommodated directly in the hollow space of the arm. The design is similar to that of the type VR 8.

The mechanism is driven by a separate electric motor fitted at the rear (inside) the arm. The power is transmitted from the motor through a worm to a worm wheel which is designed as an elevating nut which rotates and travels up and down a fixed elevating screw. The inside of the box is filled with grease diluted with oil in which the worm and worm wheel are trailing. Electric interlocking prevents the vertical movement of the arm from being started as long as the sleeve is locked.



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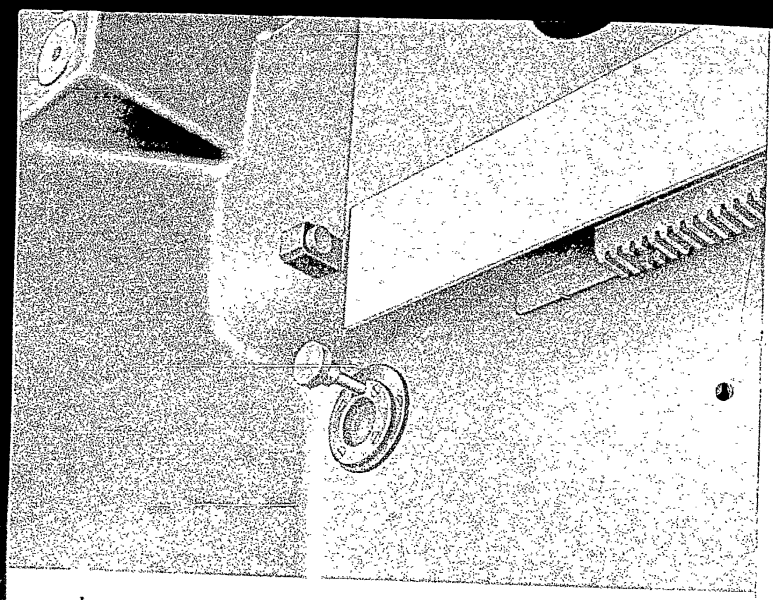


Lubrication

[illegible] the headstock are lubricated automatically by a stream of oil supplied by an oil pump in [illegible] tank to the multiplate clutch shaft from which it is splashed over the clutch plates to [illegible] other moving parts in the headstock and the bearings. Oil is also supplied to the change gears [illegible] of the headstock and splashed by them over all the bearings in the upper wall of the [illegible] lubricated are the feed box, the power and hand feed mechanism and the spindle [illegible] a bush of the headstock. The gear pump is mounted in the upper part of the headstock [illegible] together with the drilling motor. The oil level in the headstock is shown on an oil level gauge fitted at the left hand side of the headstock to which also the return oil pipe discharges from which oil flows when the lubricating operates correctly.

Every machine is subjected to a precision test in accordance with the taking-over certificate. The results of the test are entered in the certificate. The machines are shipped dismantled. The final measurements of precision must be made at site after erection. Precision tests are made by specially trained experts by means of the most modern gauges.

Standard Equipment

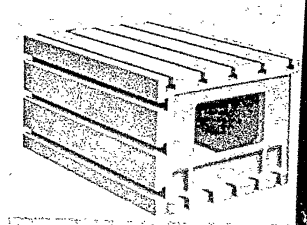
Cooling equipment
with electric motor driven pump
Electrical equipment.
Electric lighting.

Morse taper sleeves
sizes 6/5, 5/4, 5/3 and 4/3.
Taper ejectors.
Screw drivers.
Oil can.

T-slot cleaner.
Set of spanners.
Lifting hooks including bolts
and blocks.
Operating instructions.

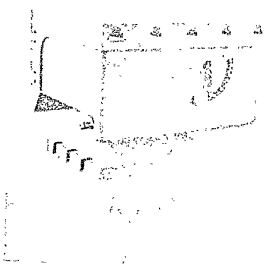
Optional Equipment

Change gears for higher range of spindle speeds, i. e. 16 to 1400 r. p. m.	style Ve 8
Change gears for higher range of spindle speeds, i. e. 16 to 1400 r. p. m.	style Ve 10
Box Type Table	style Vb 8
Universal table	style Vc 8
Vice	style Vd 4

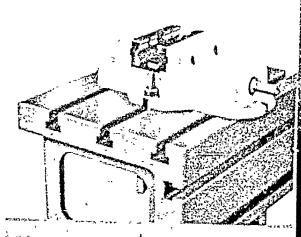


Box Type Table

Top clamping surface	mm inches	1010 × 755 40" × 30"
Number, width and spacing of T-slots	mm inches	5 × 28 × 160 5 × 1 3/32" × 6 5/16"
Side clamping surface	mm inches	1010 × 500 40" × 20"
Number, width and spacing of T-slots	mm inches	3 × 28 × 160 3 × 1 3/32" × 6 5/16"
Dimensions of base	mm inches	1060 × 750 42" × 30"
Number, width and spacing of T-slots in base	mm inches	5 × 30 × 125 5 × 1 3/16" × 5"
Overall dimensions of table	mm inches	1060 × 755 × 500 42" × 30" × 20"
Weight of table	kg lbs	110 [illegible]



Top clamping surface	mm inches	750 × 600 30" × 24"
Number, width and spacing of T-slots	mm inches	5 × 28 × 16 5 × 1 3/32" × 6 5/16"
Side working surface	mm inches	750 × 110 30" × 16"
Number, width and spacing of T-slots	mm inches	2 × 28 × 160 2 × 1 3/32" × 6 5/16"
Dimensions of base	mm inches	500 × 160 22" × 18"
Number, width and spacing of T-slots in base	mm inches	3 × 30 × 125 3 × 1 3/16" × [illegible]
Overall dimensions of table	mm inches	[illegible] × 750 25" × 24 1/2" × [illegible]
Range of tilting degrees		0 to 90
Weight of table	kg lbs	[illegible] [illegible]



Vice

Clamping plate	mm inches	160 6 9/32"
Width of jaws	mm inches	150 5 29/32"
Height of jaws	mm inches	50 1 [illegible]
Overall dimensions of vice	mm inches	385 × 220 × 115 16" × [illegible]
Weight of vice	kg lbs	8 [illegible]

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Specification

	VR 83	VR 84

Capacity of Machine

Drilling capacity in 60 kg per sq. mm (38 tons per sq. in.) steel, out of solid	mm	80	3 1/8"		
Drilling capacity in 25 kg per sq. mm (16 tons per sq. in.) cast iron, out of solid	mm	110	4 1/4"		
Boring capacity in steel	mm	300	12"		
Thread cutting capacity in 60 kg per sq. mm (38 tons per sq. in.) steel		M 75	3"		
Thread cutting capacity in 25 kg per sq. mm (16 tons per sq. in.) cast iron		M 100	4"		

Main Dimensions

Maximum distance, guideways of sleeve to spindle	mm	3150	10'4"	mm 4000	13'1 1/2"
Minimum distance, guideways of sleeve to spindle	mm	530	1'9"		
Maximum radius in extreme position of spindle	mm	3620	11'10"	mm 4470	14'8"
Maximum radius in extreme position of spindle	mm	1000	3'3 1/2"		
Maximum and minimum distance, end of spindle to clamping surface of base	mm	2832/782	9'3 1/2"/2'7"		
Maximum and minimum distance, end of spindle to clamping surface of table	mm	2332/282	7'7 3/4"/11'1/8"		
Vertical movement of arm	mm	1600	5'3"		
Travel of headstock on arm	mm	2620	8'7 1/8"	mm 3470	11'4 1/2"
Range of swing of arm		360			

Spindle

Diameter of end of spindle	mm	102	4 1/64"		
Taper in spindle		No. 6 Morse			
Diameter of spindle	mm	55	2 5/32"		
Stroke of spindle	mm	450	1'6"		
Number of spindle speeds		14			
Speed range in either direction of rotation, standard	r. p. m.	11.2 to 1000			
higher	r. p. m.	16 to 1400			
Number of spindle feeds		10			
Range of spindle feeds per rev.	mm	0.035 to 2.2	0.0014" to 0.088"		

Base

Clamping surface	mm	3235 × 1780	10'6 1/4" × 5'10"	4085 × 1780	13'4 3/4" × 5'10"
Number, width and spacing of T-slots	mm	5 × 28 × 250		5 × 1 3/32" × 10"	

Drive

Drilling motor: output/speed	kW/r. p. m.	7.5/10/1430/2910			
Elevating motor: output/speed	kW/r. p. m.	5.5/1420			
Locking motor: output/speed	kW/r. p. m.	1.1/1400			
Cooling pump motor: output/speed	kW/r. p. m.	0.125/2800			

Dimensions and Weights

Dimensions of base	mm	4500 × 1800	14'9" × 5'11"	5350 × 1800	17'7" × 5'11"
Dimensions of machine	mm	4710 × 1800 × 5000	15'7" × 5'11" × 16'5"	5390 × 1800 × 5000	17'8" × 5'11" × 16'5"
Working space required	mm	5700 × 8700 × 5000	28'7" × 28'7" × 16'5"	10400 × 10400 × 5000	34'2" × 34'2" × 16'5"
Weight of machine with standard equipment	kg	14000	30860 lbs	kg 16000	35300 lbs
Shipping weight of machine, railway packing	kg	15000	33070 lbs	kg 17200	37920 lbs
Shipping weight of machine, seaworthy packing	kg	16000	35600 lbs	kg 18500	41150 lbs
Dimensions of seaworthy packing	mm	machine is shipped dismantled			
Volume of seaworthy packing	cu. metres	21.4		26.1	
	cu. feet	862		918	

Specification

	VR 103	VR 104

Capacity of Machine

Drilling capacity in 60 kg per sq. mm (38 tons per sq. in.) steel, out of solid	mm	100	4"		
Drilling capacity in 25 kg per sq. mm (16 tons per sq. in.) cast iron, out of solid	mm	125	5"		
Boring capacity in steel	mm	350	14"		
Thread cutting capacity in 60 kg per sq. mm (38 tons per sq. in.) steel		M 100	4"		
Thread cutting capacity in 25 kg per sq. mm (16 tons per sq. in.) cast iron		M 120	5"		

Main Dimensions

Maximum distance, guideways of sleeve to spindle	mm	3150	10'4"	mm 4000	13'1 1/2"
Minimum distance, guideways of sleeve to spindle	mm	530	1'9"		
Maximum radius in extreme position of spindle	mm	3620	11'10"	mm 4470	14'8"
Minimum radius in extreme position of spindle	mm	1000	3'3 1/2"		
Maximum and minimum distance, end of spindle to clamping surface of base	mm	2785, 710	9'2" 2'4		
Maximum and minimum distance, end of spindle to clamping surface of table	mm	2255/210	6'6" 8'1 4"		
Vertical movement of arm	mm	1600	5'3"		
Travel of headstock on arm	mm	2620	8'7 1/8"	mm 3470	11'4 1/2"
Range of swing of arm		360			

Spindle

Diameter of end of spindle	mm	110	4 3/8"		
Taper in spindle		No. 6 Morse			
Diameter of spindle	mm	65	2 9/16		
Stroke of spindle	mm	475	1'10 1/2"		
Number of spindle speeds		14			
Speed range in either direction of rotation, standard	r. p. m.	11.2 to 1000			
higher	r. p. m.	16 to 1400			
Number of spindle feeds		10			
Range of spindle feeds per rev.	mm	0.056 to 3.54			

Base

Clamping surface	mm	3235 × 1780	10'6 1/4" × 5'10"	4085 × 1780	13'4 3/4" × 5'10"
Number, width and spacing of T-slots	mm	5 × 28 × 250		5 × 1 3/32" × 10"	

Drive

Drilling motor: output/speed	kW/r. p. m.	7.5/10/1430/2910			
Elevating motor: output/speed	kW/r. p. m.	5.5/1420			
Locking motor: output/speed	kW/r. p. m.	1.1/1400			
Cooling pump motor: output/speed	kW/r. p. m.	0.125/2800			

Dimensions and Weights

Dimensions of base	mm	4500 × 1800	14'9" × 5'11"	5350 × 1800	17'7" × 5'11"
Dimensions of machine	mm	4710 × 1800 × 5000	15'7" × 5'11" × 16'5"	5390 × 1800 × 5000	17'8" × 5'11" × 16'5"
Working space required	mm	5700 × 8700 × 5000	28'7" × 28'7" × 16'5"	10400 × 10400 × 5000	34'2" × 34'2" × 16'5"
Weight of machine with standard equipment	kg	14000	30860 lbs	kg 16000	35300 lbs
Shipping weight of machine railway packing	kg	15000	33070 lbs	kg 17200	37920 lbs
Shipping weight of machine, seaworthy packing	kg	16000	35600 lbs	kg 18500	41150 lbs
Dimensions of seaworthy packing	mm	machine is shipped dismantled			
Volume of seaworthy packing	cu. metres	21.4		26.1	
	cu. feet	862		918	

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS

The particulars in the prospectus are not binding in detail

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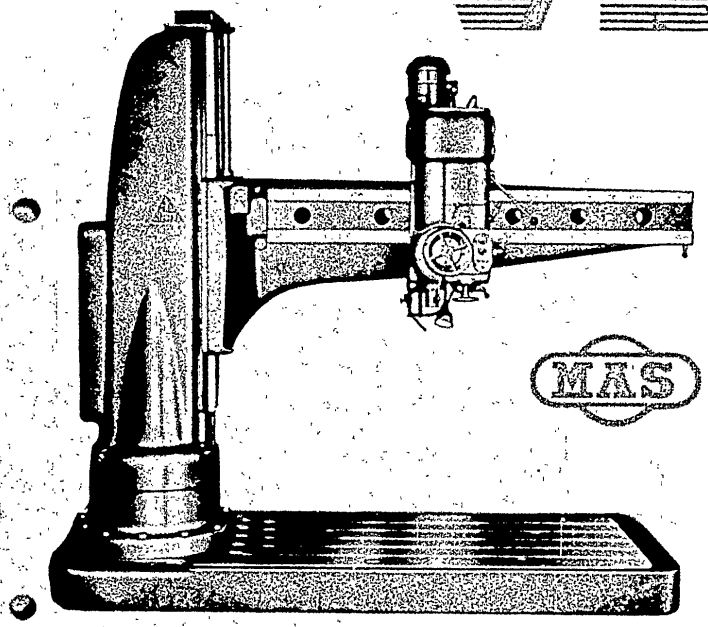
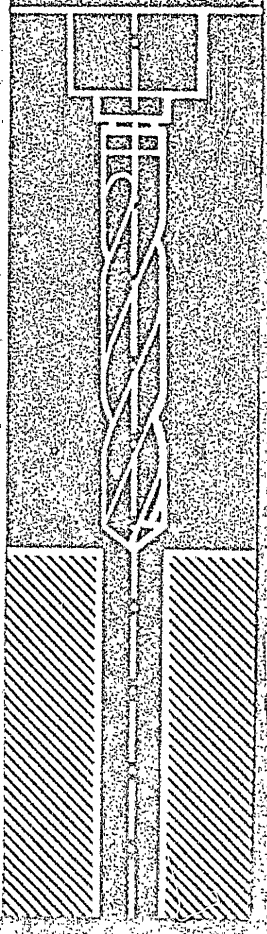
RADIAL DRILLING MACHINES

Type VR 83 84





These machines are intended for the drilling and boring of holes and cutting of threads in big and complicated machinery parts. There are many uses for them in individual manufacture as well as in quantity production.

The new design of these machines constitutes an improvement in that the rigidity of the main structural parts has been increased and, as a result, the general precision of the machines improved. The new design consists in the arm being carried on the sleeve on wide prismatic guideways. The advantages achieved thereby are a lasting increased accuracy and easy movement.

The machines are built in the following two models:

Model VR 83 with a radius of 3,150 mm and

Model VR 84 with a radius of 4,000 mm.

OUTSTANDING FEATURES:

High capacity and sustained high accuracy.

Wide range of spindle speeds arranged in 16 steps of standard range with possibility of changing over to higher range.

Wide range of power feeds.

Mechanical elevation of arm.

Automatic disengagement of power feed when required depth of drilling is reached.

Handy and concentrated arrangement of controls on spindle head which substantially reduces setting-up times.

Easy cleaning, lubrication and maintenance of all parts of machine.

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DESCRIPTION

THE SPINDLE HEAD.

The spindle head forms a totally enclosed box. It is easy to move along the arm by means of a hand wheel and can be locked in any required position by means of a lever arranged at the right hand side of the spindle head.

The gear box of the spindle head has 12 speeds arranged to geometrical progression with a coefficient of 1.41. Gears for a higher speed range are supplied by the machine to special order. Their exchange is easy to make when the top cover of the spindle head is removed. The gear box is driven by a flange mounted motor controlled by a cross type switch. The machines are equipped with partial pre-selection.

THE SPINDLE.

The spindle runs in precision anti-friction bearings. The weight of the spindle is balanced by a counterweight. The feed box forms an independent unit and is arranged at the right-hand side of the central part of the spindle head.

The spindle has a hand feed and a power feed. There are two kinds of hand feeds coarse, by means of hand levers in the power feed head and fine by means of a hand wheel on the lower part of the spindle head. The safety clutch of the feed allows only the maximum permissible power to be transmitted and thus protects the machine from damage. The clutch is controlled by a lever arranged above the depth scale. This same lever also serves for disengaging the power feed when working to a positive stop. The required depth of drilling is set on a circular scale with a vernier. This arrangement permits the depth of drilling to be set with an accuracy of 0.05 mm. (.002").

STRUCTURAL PARTS OF MACHINE.

The arm is marked by its outstanding rigidity. The wide guideways of the spindle head are accurately ground. The sleeve is suspended in the column by means of a sturdy tapered roller bearing. It is guided at the bottom by several radial ball bearings running in hardened bushes on adjustable eccentric pins. This arrangement results in a lasting high accuracy and easy movement. The sleeve is locked on the column by means of a separate motor fitted at the bottom of the sleeve and controlled by a push button on the switch panel of the spindle head. The base is provided with T-slots for the clamping of work pieces.

COOLING.

The machine is equipped with a cooling system with an independent centrifugal pump which supplies coolant from a tank formed in the rear part of the base through a pipe line to the tool.

LUBRICATION.

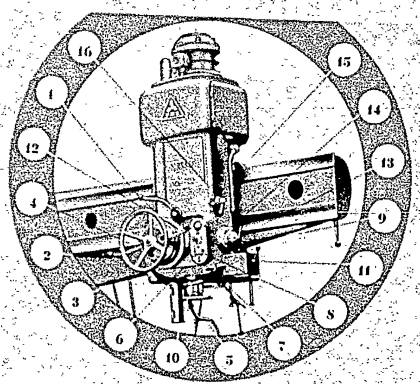
All moving parts of the spindle head are lubricated automatically by a stream of oil supplied by an oil pump in the spindle head from a tank arranged in the lower part of the spindle head to the multi-plate clutch shaft from which it is thrown over the clutch plates to the gears. The guideways of the arm on the column and the elevating screw are lubricated by a three piston hand pump provided with a device controlling the quantity of oil supplied to the various points.

STANDARD EQUIPMENT.

Electrical equipment including electric motors, cooling equipment, 2 hooks for lifting the spindle head including bolts and nuts, T-blocks and plugs, 4 hooks for lifting the base, set of Morse taper sleeves sizes 4/3, 3/2, 2/1, 1/0 and 1/2, set of spanners, oil can, T-slot cleaner, 2 screw-drivers, instruction book.

SPECIAL EQUIPMENT.

2 change gears for higher range of spindle speeds, i. e. 16 to 1400 r. p. m., style Ve 8, box type table style Vd 8, universal table style Ve 8, vice, style Vd 47.



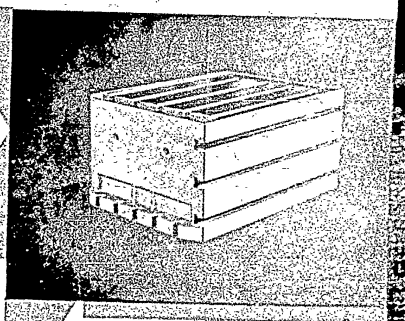
OPERATION.

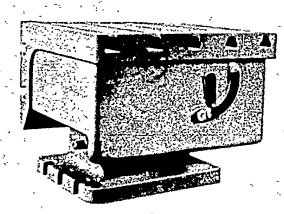
The controls of the machines are conveniently arranged and centralized on the lower part of the spindle head.

1. *Lever for engaging clutch of positive stop.*
2. *Levers for engaging power and hand feeds.*
3. *Hand wheel for setting spindle head.*
4. *Lever for finely setting scale to depth of drilling.*
5. *Wheel for fine hand feed.*
6. *Push button for locking sleeve on column.*
7. *Light switch.*
8. *Signal bulb for locking sleeve on column.*
9. *Push button for unlocking of sleeve on column.*
10. *Clutch lever serving also for engagement of pre-selected speed.*
11. *Cross-type switch for starting elevating motor and motor for spindle drive.*
12. *Feed engaging levers.*
13. *Scale for pre-selection of speeds.*
14. *Lever for locking the spindle head.*
15. *Back gear lever.*

BOX TYPE DRILLING TABLE STYLE Vd 8

Top working surface	mm	1010×255
	inches	40"×20"
Number, width and distance between T-slots	mm	3 – 22 – 160
	inches	3 – ⅞" – 6 ⅜"
Side working surface	mm	1010×500
	inches	40"×20"
Number, width and distance between T-slots	mm	3 – 22 – 160
	inches	3 – ⅞" – 6 ⅜"
Dimensions of base	mm	1060×750
	inches	42"×30"
Number, width and distance between T-slots in base		3 – 30 – 125
	inches	3 – 1 ⅛" – 5"
Overall dimensions of table	mm	1060×755×500
	inches	42"×30"×20"
Weight of table	kg	410
	lbs	905





UNIVERSAL DRILLING TABLE STYLE Ve 8

Top working surface	mm	1060×360
	inches	42"×14"
Number, width and distance between T-slots		3 – 22 – 160
	inches	3 – ⅞" – 6 ⅜"
Side work ez surface	mm	1060×500
	inches	42"×20"
Number, width and distance between T-slots	mm	2 – 22 – 160
	inches	2 – ⅞" – 6 ⅜"
Dimensions of base	mm	1060×800
	inches	42"×31"
Number, width and distance between T-slots in base	mm	3 – 30 – 125
	inches	3 – 1 ⅛" – 5"
Overall dimensions of table	mm	930 850 540
	inches	37" 33 ½" 21"
Range of tilting	degrees	0 – 90
Weight of table	kg	630
	lbs	1390

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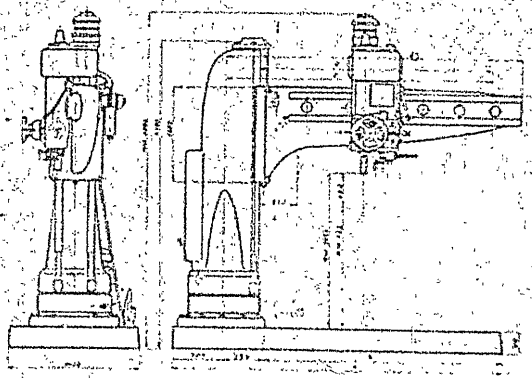
SPECIFICATION:

Type		VR 63		VR 84	
Maximum distance, guideway prism to extreme position of spindle	mm	3150	10'4"	4000	13'1"
Minimum distance, guideway prism to spindle	mm	530	1'9"		
Maximum radius in extreme position of spindle	mm	3620	11'10"	4470	14'8"
Maximum and minimum distance, spindle nose to working surface of base	mm	2432,782	101"/30,7"		
Vertical movement of arm	mm	1600	63"		
Travel of spindle head on arm	mm	2620	8'7"	3470	11'5"
Swing of arm on column		360°			
Dimensions of base	mm	4500×1800	14'9"×5'11"	5350×1800	17'7"×5'11"
Working surface of base	mm	3235×1250	10'7"×5'10"	4085×1250	13'5"×5'10"
Height of base	mm	500	1'		
Number, width and distance between T-slots of base	mm	5×28×250	5×1 1/2"×10"		
Diameter of spindle and spindle nose	mm	82×102	2,13"×4"		
Taper in spindle		No. 6 Morse			
Lift of spindle	mm	450	17,7"		
Number of spindle speeds		18			
Speed range, standard	r. p. m.	11,2—500		22,5—1000	
higher	r. p. m.	16—710		31,5—1400	
Number of spindle feeds		10			
Range of feeds	mm per rev.	0,035—2,2	0,0014" to 0,086" per. rev.		
Maximum diameter of drilling in steel with tensile strength of 60 kg per square mm	mm	80	3,15"		
Maximum diameter of drilling in steel with tensile strength of 25 kg per square mm	mm	110	4,3"		
Maximum size of thread cut in steel/cast iron		M33/M100	3" / 4"		
Maximum diameter of boring in steel with tensile strength of 60 kg per square mm	mm	300	11,8"		
Drilling motor 1420/2910 r. p. m.	kW	7,5/10			
Elevating motor 1420 r. p. m.	kW	3,5			
Clamping motor 1400 r. p. m.	kW	1,1			
Coolant pump motor 2800 r. p. m.	kW	0,215			
Weight of machine	kg	14000, 31000 lbs	kg	16000	35300 lbs
Overall dimensions of machine	mm	4740×1500×3000	15'7"×5'11"×16'5"	5300×1500×3000	17'5"×5'11"×16'5"

A	4500		5350	
	177"		210"	
B	3235		4085	
	127"		161"	
C	3620		4470	
	143"		176"	
D	3150		4000	
	124"		157"	
E	4960		4890	
	195"		192"	



Please state in your order the voltage available for electric motors.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

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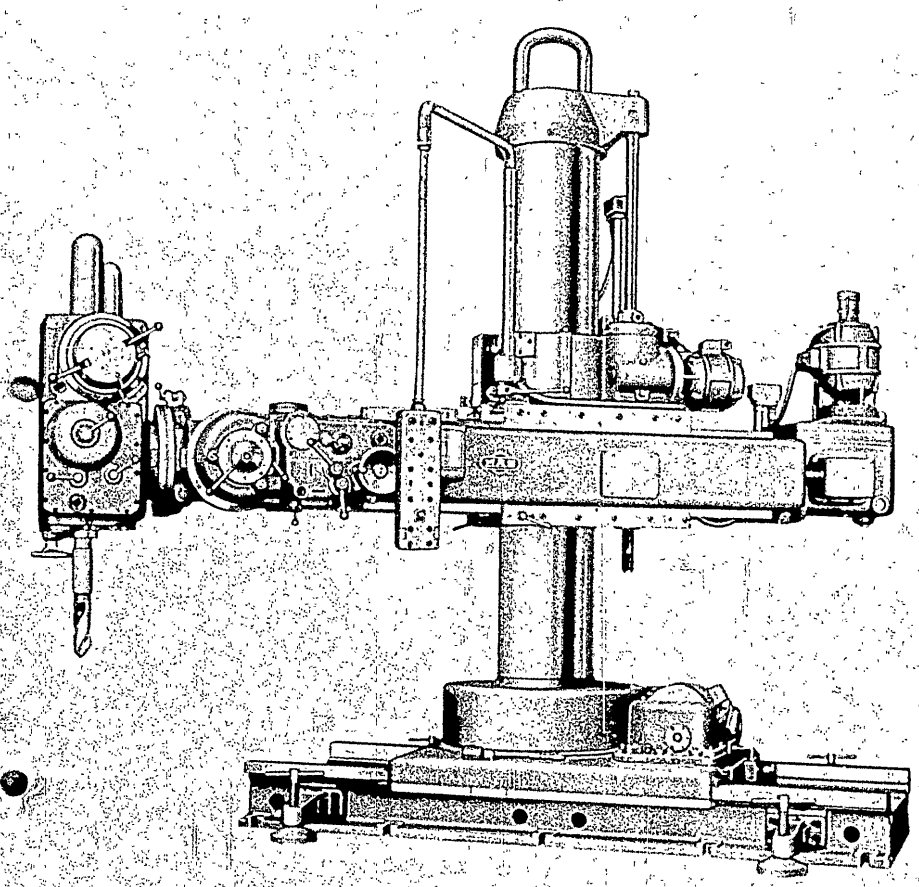

MAS

UNIVERSAL RADIAL DRILLING MACHINE

TYPE

VRM 50

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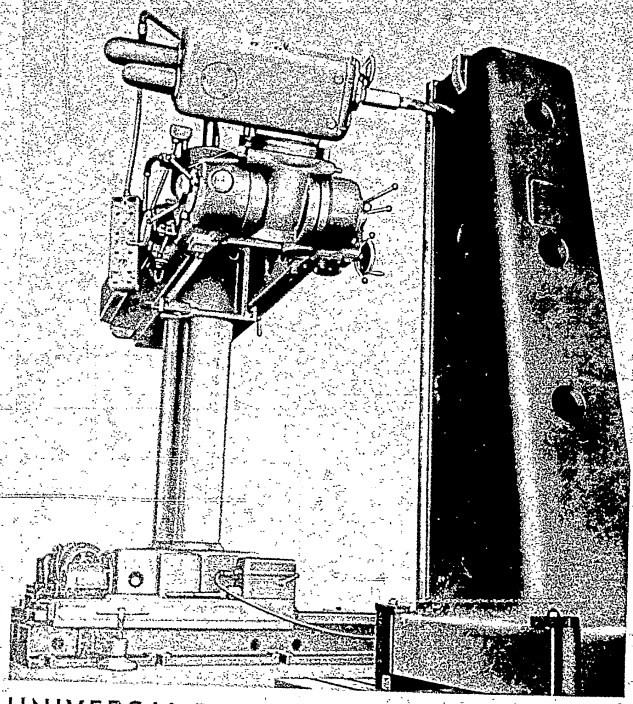

UNIVERSAL RADIAL DRILLING MACHINE

TYPE

VRM 50

The machine is intended for the drilling and reaming of holes and cutting of threads under various angles on parts or structures of large sizes in cases when the part cannot be taken to the drilling machine. The machine can be carried by a crane and it is suitable in particular for erection work on heavy machines such as planing or boring machines, turbines, bridge structures, large boilers, etc. in heavy machine, boiler or bridge shops.

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DESCRIPTION

The structural design of the carrying parts, the power movement of which is easy to control by means of push buttons on a suspended box, permits the spindle to be set with ease to any position.

The required setting of the machine can be accomplished by the following movements:

The movement of the slide to which the column is attached on the bed. The movement of the slide is driven by a gear box with own electric motor. The accurate setting is then made by hand. The extreme positions of the slide are limited by limit switches which automatically release the power feed. The slide is clamped on the guideways of the bed by means of hand levers.

The swivel of the arms which is operated by hand with a minimum of effort because the shell of the column is mounted on anti-friction bearings. The shell is locked on the column by power. The locking box with its own electric motor is fitted on the slide of the column and the locking is controlled by push-buttons on the suspended control box.

The vertical movement of the sleeve with the arms on the shell. The sleeve is suspended on a screw which is rigidly anchored in the head of the shell. The movement of the sleeve is operated by an elevating nut and gear with its own electric motor. A safety nut protects the machine from damage in case of failure of the threads in the elevating nut. The sleeve can be locked on the shell by means of hand levers.

The horizontal movement of the arms in the guideways of the sleeve. The feed is power and hand operated and the feed mechanism is fitted with its own electric motor. The arms are locked in their set position by means of hand levers.

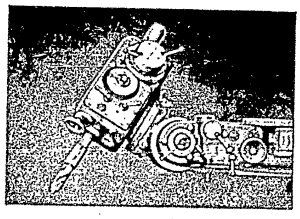
The tilting of the head up to an angle of 90° upward and 90° downward. The head is tilted by power by means of the same electric motor which drives the movement of the arms in the sleeve. The tilting head is locked by tightening the nuts of the clamping bolts.

The swivel of the headstock which is mounted with a rotary movement in the body of the tilting head. The headstock can be swivelled from either side by means of a hand lever. The angle of swivel is shown on a scale. The headstock is locked in its set position by means of a hand lever.

The spindle has 18 speeds which are changed by means of two levers on the front end of the arms from either side of the machine. One lever, which is mounted on the front cover of the headstock, serves for engaging the high or low range of speeds. The spindle is driven by an electric motor fitted on the gear box and remote controlled by push-buttons in either direction of rotation. The motor starts by automatic star-delta starting. When the "Stop" push button is depressed the motor is automatically switched back to star and stopped. The motor can also be directly reversed by means of the push buttons in which case the motor always initially starts in the opposite direction of rotation star connected. When the appropriate changeover switch on the control box is switched over the operation of the push-button is changed from continuous to intermittent operation. In the latter case the motor is always star connected.

The power feeds of the spindle are arranged in 6 steps which can be engaged by means of a lever mounted in the upper part of the front cover. There are two kinds of hand feed. Coarse, operated by a lever fitted in the upper part of the headstock and fine, operated by a hand wheel on the bottom part of the headstock. A scale permits the depth of drilling to be accurately set by means of a positive stop. The spindle is balanced by a counterweight regardless of the position in which it may be set in space.

The machine is marked by rigidity of its entire structure and by a high degree of stability. The arms are carried in a rigid frame by the gear box at one end and by the tilting head at the other. The bed is provided with folding supporting brackets which further increase the stability of the machine. The gear box as well as the drive box of the arms have force feed circulating lubrication. The components of the headstock are splash lubricated in any position. The reliable electrical equipment contains a contactor combination with protective elements.



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SPECIFICATION

VRM 50

Drilling capacity in steel	mm	50	2"
Thread cutting capacity in steel		M 48	2"
Distance, centre-line of spindle to centre-line of column:			
maximum	mm	2227	7'3"
minimum	mm	1127	3'7"
Distance, centre-line of spindle set horizontally to floor:			
minimum	mm	400	15 3/4"
maximum	mm	2734	9'0 7/8"
Distance, end of spindle to floor:			
maximum with spindle retracted	mm	1745	5'8 11/16"
minimum with spindle retracted	mm	573	1'8 3/4"
minimum with spindle fully extended	mm	173	6 13/16"
Drilling depth	mm	350	13 3/4"
Diameter of spindle	mm	65	2 7/16"
Taper in spindle		No. 4 Morse	
Diameter of shell of column	mm	400	15 3/4"
Dimensions of bed without supporting brackets	mm	1050 × 2620	3'5 5/16" × 8'7 1/16"
Tilt of headstock around horizontal axis		360°	
Tilting of head with headstock from horizontal axis downward		90°	
Tilting of head with headstock from horizontal axis upward		90°	
Movement of slide on bed	mm	1220	4'
Movement of arms in guideways of sleeve	mm	800	2'7 1/2"
Swivel of arms in horizontal plane		360°	
Spindle speeds:			
number		18	
range	r. p. m.	16 to 803	
Feeds:			
number		6	
range, per rev.	mm	0.05 to 0.5	0.002" to 0.02"
Rate of travel of slide on bed, per minute	mm	2300	7'6 1/8"
Electric motor of headstock:			
speed	r. p. m.	1420	
output	kW	4	
Floor space required by machine	mm	3600 × 2620	11'9" × 8'7"
Height of machine	mm	3335	10'11 1/32"
Weight of machine, approx.	kg	7250	15 950 lbs

Standard Equipment: Electrical equipment including motors for 380 Volts, 3 phase, 50 cycles; oil can; operating instructions.

Optional Equipment: Electrical equipment including motors for other systems than 380 Volts, 3 phase, 50 cycles; cooling equipment.

Special Design: We supply the machine, to special order, with a spindle with a No. 5 Morse taper (diameter of spindle 80 mm).

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS!

The particulars in the prospectus are not binding in detail.

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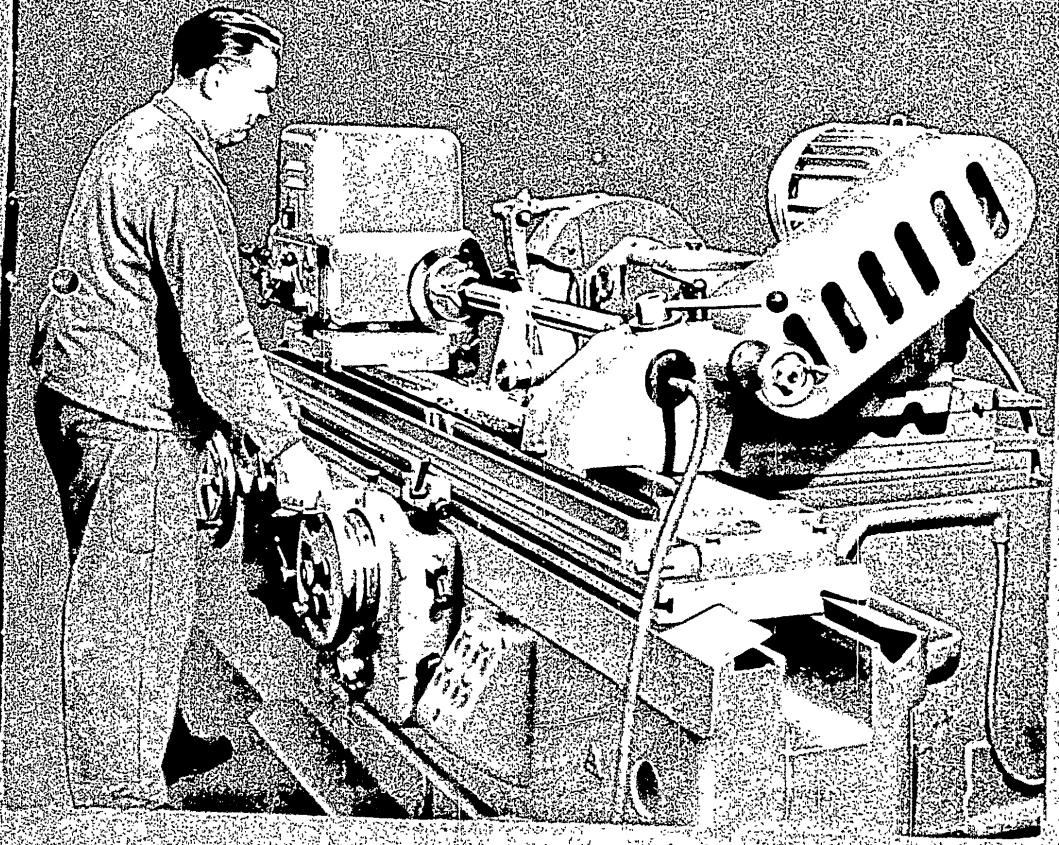
KAMENÍČEK Types

5U-7U

UNIVERSAL GRINDING MACHINES



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5U
7U

TOS

KAMENIČEK Types 5U, 7U
UNIVERSAL GRINDING MACHINES

are heavy duty precision machines equipped with hydraulic table traverse and infeed. The machines are suitable for cylindrical grinding, both longitudinal and infeed, as well as for surface and internal grinding. The setting of the grinding machines for the various operations is very easy and quick so that they can be utilized economically for both single piece and multiple production.

The types 5 U and 7 U grinding machines, the hydraulic infeed of which is operated in both table reversals or in one of them, depending on the setting, are supplied designed with power cross feed for infeed grinding and are fitted with a hydraulic tailstock.

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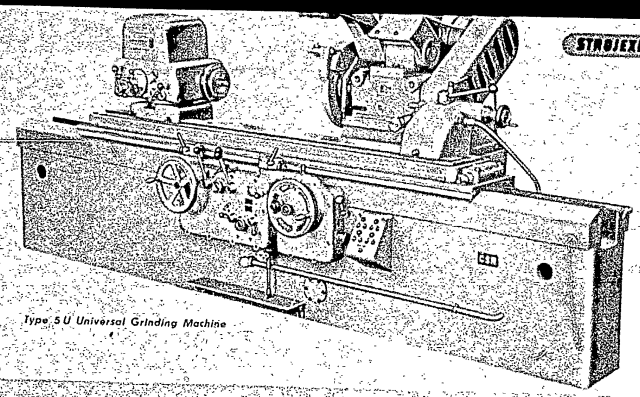
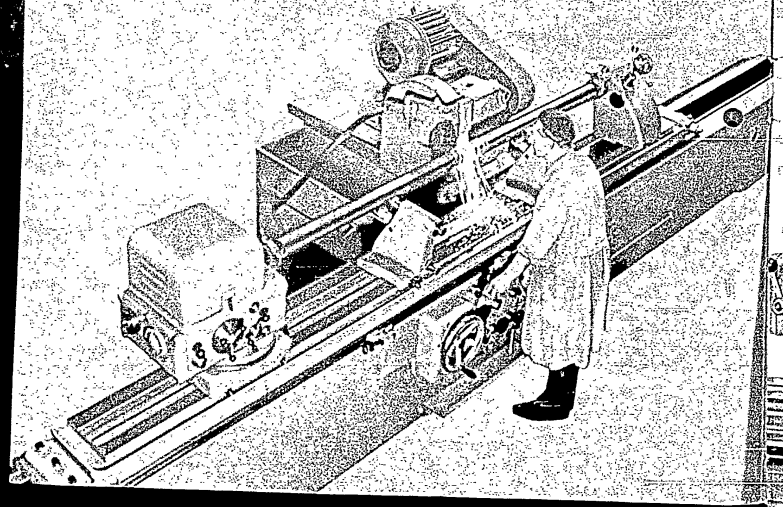
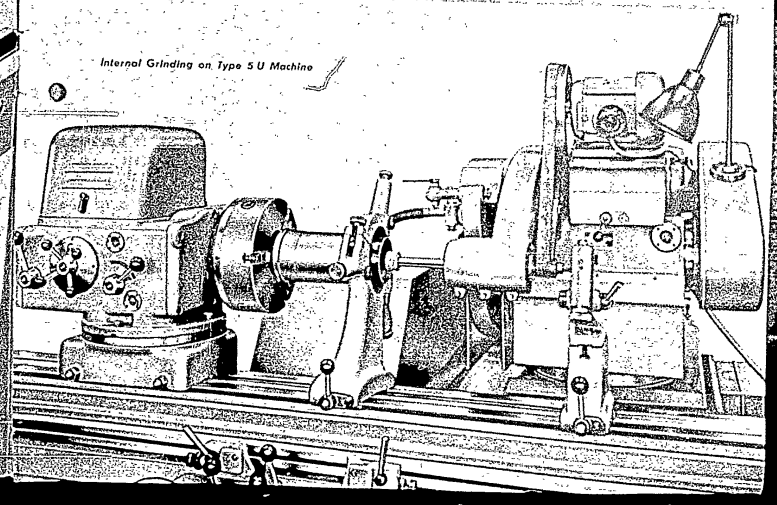


Type 5 U Universal Grinding Machine

OUTSTANDING FEATURES

Hydraulic table traverse.
Hydraulic infeed.
Hydraulic rapid traverse of wheelhead.
Swivelling wheelhead for infeed grinding of tapers.
Workhead with 8 spindle speeds swivelling 90° for surface grinding.
Hand table traverse and infeed.
Possibility of equipping machine with attachments supplied as optional equipment which increase its universal applicability, i. e.: Folding internal grinding attachment.
Attachment for grinding steep tapers.
Magnetic chuck for face grinding.





Internal Grinding on Type 5 U Machine

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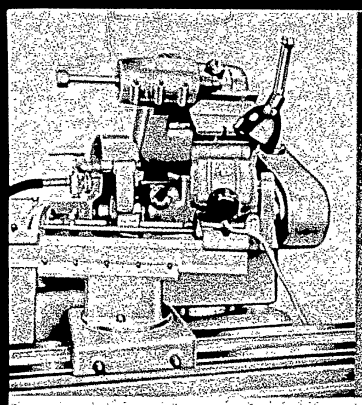
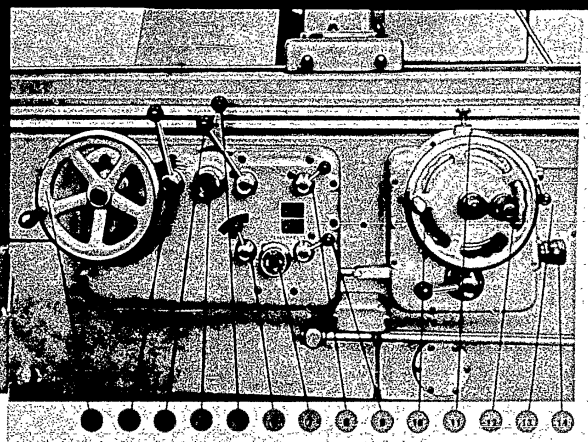


5U

TOS

UNIVERSAL GRINDING MACHINE



Attachment for Grinding Steep Tapers and Internal Grinding Spindle (Optional Equipment)

1. Hand Wheel of Table Traverse.
2. Lever of Rapid Hydraulic Withdrawal.
3. Starting Lever of Hydraulic Table Traverse.
4. Push-Button for Stopping of Table during Reversals.
5. Table Traverse Reversing Lever.
6. Push-Button for Softening of Table Reversal.
7. Main Valve of Traverse.
8. Adjustment of Rate of Table Traverse.
9. Adjustment of Run of Independent Feed.
10. Hand Wheel of Infeed
11. Sliding Positive Stop for Enabling of Diameter by Grinding against Positive Stop.
12. Dividing Wheel for Accurate Setting of Position of Scale.
13. Starting Lever of Power Infeed.
14. Setting of Rate of Infeed.

DESCRIPTION

The Workhead is arranged for grinding between dead centres or in a chuck. The workhead can be swivelled 90° for surface grinding and the work-piece can be fixed to a magnetic chuck. The spindle, which is made of nitriding steel, is mounted in adjustable plain bearings. The workhead is lubricated by an automatic pressure lubricating system.

The Wheelhead swivels, on the type 5 U machines, 60 and on the type 7 U machines 90° in either direction. It is equipped with hydraulic rapid traverse. The spindle is mounted in adjustable plain bearings and driven by an independent electric motor. The machines may be equipped with a folding internal grinding attachment, supplied as optional equipment, which is attached to the wheelhead and is driven by an independent electric motor.

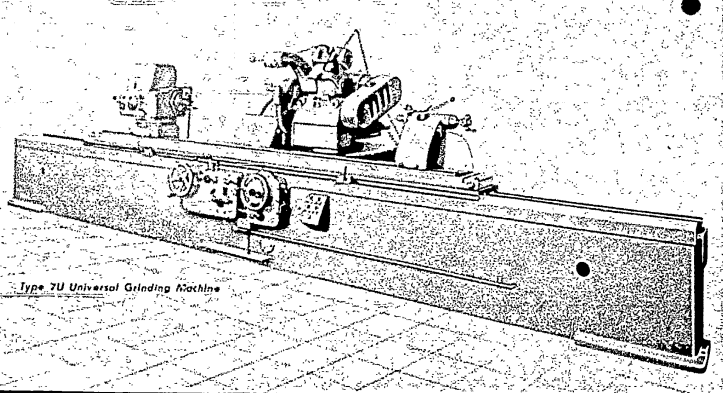
The Table consists of two parts. The lower part is mounted in a prismatic and in a flat guideway of the bed, the upper part may be swivelled in accordance with a scale for grinding tapers. The hydraulic table feed can be limited by stops which have a coarse and a fine adjustment. The dwell in the reversals is variable. The oscillation of the table for infeed grinding is adjustable.

The Tailstock. The tailstock sleeve can be moved, apart from hydraulically, also by a hand lever. The pressure of the center against the workpiece can be adjusted as required by a spring. A diamond bracket is also fitted to the tailstock.

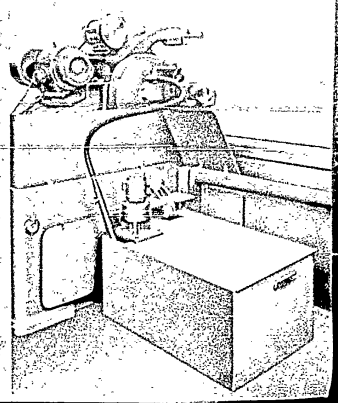
The Bed. The guideways of the bed are lubricated automatically. The lower part of the bed forms the oil tank of the hydraulic pump.

Cooling. The coolant pump is fitted next to the machine in a tank with settling stages.

The Electrical Equipment consists of the statically and dynamically balanced electric motors for the workhead and wheelhead and of the electric motor of the pump for the hydraulic system and for the coolant. The motors are equipped with protective contactors which are remote controlled by push-buttons.



Type 7U Universal Grinding Machine



Coolant Tank with Pump

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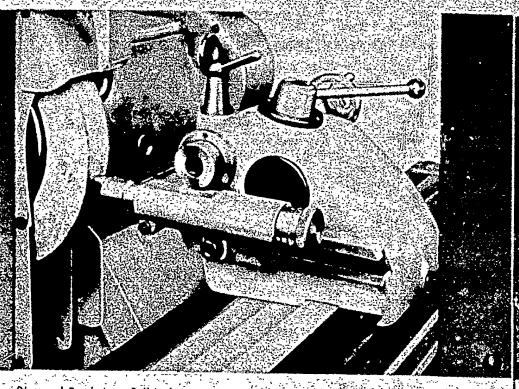
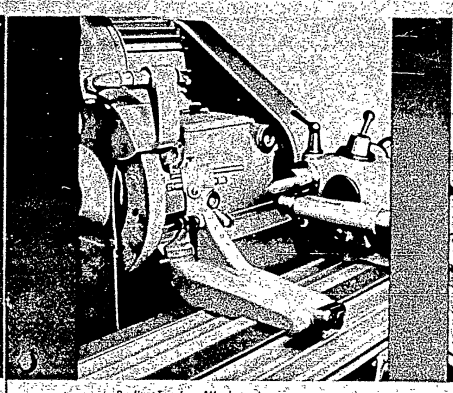
5U
7U

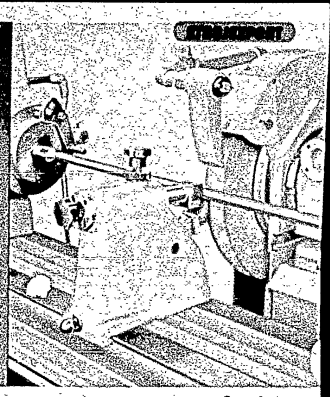
TOS



Diamond Bracket on Tailstock



Radius Trueing Attachment



Open Rest

STANDARD EQUIPMENT AND ACCESSORIES

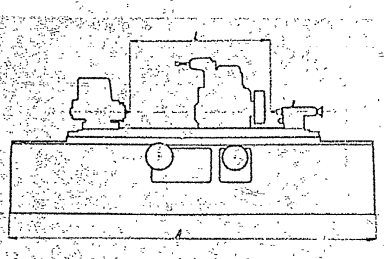
Universal workhead.
Three-jaw chuck for type 5 U machine approx. 200 mm (7⅞") dia.
for type 7 U machine approx. 320 mm (12⅝") dia.
Tailstock with hydraulic control of tailstock sleeve.
Diamond bracket without diamond.
Two centers.
Grinding wheel with balancing flange for type 5 U machine 450×50×203 mm (18"×2"×8").
for type 7 U machine 500×75×203 mm (20"×3"×8").
Flange puller.
Balancing arbor.
Wheelguard.
Extra belt pulley for worn grinding wheel.
Open rests: for type 5 U machine for 1 000 mm (39⅜") between centers 1 unit
for 1 500 mm (59") between centers 2 units,
for 2 000 mm (78¾") between centers 3 units,
for type 7 U machine for 2 500 mm (8'3") between centers 2 units,
for 3 000 mm (9'10") between centers 3 units.
Set of drivers.
Coolant pump with piping and tank.
Set of splash guards.
4 electric motors for 380 Volts, 50 cycles.
Electrical equipment for 380 Volts, 50 cycles.
Set of belts.
Set of spanners.
Operating instruction booklet.

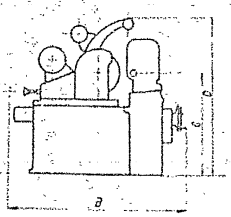
OPTIONAL EQUIPMENT

Folding internal grinding attachment: for type 5 U machine for 100 mm (3⅞") dia. internal spindles.
for type 7 U machine for 100 mm (3⅞") dia. internal spindles.
Reducing sleeves for 70 mm (2¾") dia. internal grinding spindles.
Close rest for type 5 U machine up to 105 mm (4⅛") dia.
for type 7 U machine up to 170 mm (6¹¹⁄₁₆") dia.

Folding diamond bracket, table type (without diamond).
Radius trueing attachment (without diamond).
Profile trueing attachment (without template or diamond) consisting of a cross slide the top part of which moves crosswise and carries the sleeve with the diamond holder. The top is pressed against the template by a spring. The bottom slide affords a longitudinal movement controlled by a hand wheel by means of a screw.
Attachment for grinding steep tapers between dead centers (tapers up to 120°). The attachment consists of a rotary table on which the workhead and the tailstock of the attachment are fitted on a slide. The workhead is driven by an independent electric motor.
Additional balancing flange for grinding wheel.
Balancing stand.
Additional rest.

Collet chuck attachment.
for type 5U machine with range from 5 to 16 mm (¾" to ⅝") dia. arranged in 0.5 mm increments. The attachment is supplied including one collet. No collet chuck attachment is supplied for the type 7U-machine.
Collets.
Additional spindles for internal grinding according to special specification.
Electromagnetic chucks:
for type 5U machine 200 mm (7⅞") dia.
for type 7U machine 300 mm (11¾") dia.
The chucks are supplied with demagnetizing switch
Rectifier for electromagnetic chuck.
Electric motors and electrical equipment for other voltages than 380 Volts 50 cycles





Lighting of machine.

	5U			7U	
L	1 000	1 500	2 000	2 500	3 000
A	3 070	3 930	7 720	6 500	7 500
B	2 110	2 110	2 110	2 180	2 180
C	1 100	1 100	1 100	1 330	1 330
D	1 650	1 650	1 650	1 960	1 960

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SPECIFICATION:

		5 U		7 U	
Swing over bed	mm	400	15 3/4"	660	26"
Grinding wheel, diameter	mm	450 × 50 203	18" × 2" 8"	500 × 75 203	20" × 3" 8"
width, bore					
Taper of workhead center		No. 4 Morse		No. 5 Morse	
Taper of center in tailstock sleeve		No. 4 Morse		No. 5 Morse	
Swing in open rest	mm	120	4 23/32"	180	7 3/32"
Diameter of chuck	mm	200	7 7/8"	320	12 19/32"
Bore in sleeve for internal grinding spindle	mm	100	3 15/16"	100	3 15/16"
Swivel of workhead		90°		90°	
Swivel of wheelhead		60		90	
Transverse movement of wheelhead	mm	190	7 1/2"	250	9 27/32"
Hydraulic rapid traverse of wheelhead	mm	55	2 5/32"	55	2 1/32"
Movement of wheelhead on slide	mm	280	11"	285	11 7/32"
Speed of grinding wheel	r. p. m.	1285, 1525		1165 1390	
Number of grinding wheel speeds		8		8	
Range of workspindle speeds	r. p. m.	15 to 375		12 to 290	
Power infeed:					
in reversals of table for longitudinal grinding, reduction of diameter	mm	0.005 to 0.04	0.0002" to 0.0016"	0.005 to 0.05	0.0002" to 0.002"
in plunge-cut grinding, per minute	mm	0.1 to 4	0.004" to 0.16"	0.05 to 4	0.002" to 0.16"
Speed of table (hydraulic) per minute, infinitely variable	metres	0.1 to 6	4" to 19'8"	0.1 to 5	4" to 16'5"
Output of workhead motor	kW	0.8		1.1	
Output of wheelhead motor	kW	5.5		7.5	
Output of motor for internal grinding	kW	1.6		1.6	
Output of coolant pump motor	kW	0.175		0.175	
Output of hydraulic pump motor	kW	1.85		2.2	

Type	Distance Between Centers	Maximum Longitudinal Travel of Table	Swivel of Table	Width of Machine	Length of Machine	Weight of Machine	Shipping Weight of Machine
5 U	1 000 mm 39 15/32"	1 125 mm 44 1/32"	6°	2 100 mm 6'11"	3 400 mm 11'2"	5 500 kg 12 130 lbs	6 380 kg 14 070 lbs
	1 500 mm 59 1/16"	1 625 mm 64"	5°		4 400 mm 7'3"	5 600 kg 12 790 lbs	6 900 kg 15 210 lbs
	2 000 mm 78 3/4"	2 150 mm 84 21/32"	5°		5 650 mm 9'4"	6 400 kg 14 110 lbs	7 600 kg 16 760 lbs
7 U	2 500 mm 8'3"	2 650 mm 8'8"	4°20'	2 500 mm 8'3"	6 600 mm 21'8"	9 100 kg 20 000 lbs	10 800 kg 23 810 lbs
	3 000 mm 9'10"	3 150 mm 10'4"	3°40'		7 500 mm 24'8"	9 900 kg 21 830 lbs	11 900 kg 26 230 lbs

The illustrations and particulars are not binding.

Please state in your order the voltage and power system available for the electric motors

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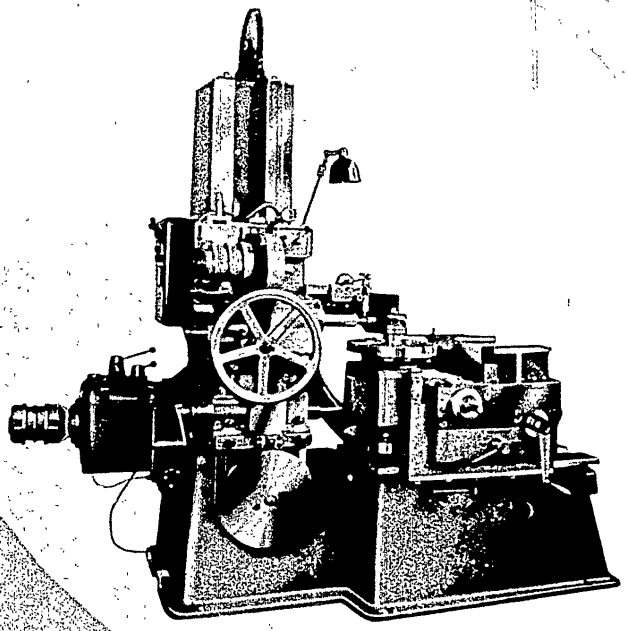
Universal Cam Grinding Machine

TOS



BEK 81

is a Special Heavy Duty Machine designed for the grinding of peripheral, face or cylindrical cams by mechanical copying from templates. Equally suitable for single part and mass production.

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THE BED forms a rigid, wide and sturdy base for the machine, resisting distorting influences and forces set up during operation. The side walls are reinforced by diagonal ribs. The flat, wide guideways are accurately ground.

THE FEED BOX is attached to the left hand side of the bed and driven by a self-contained flange mounted electric motor. The motor power is transmitted from the box to the template spindle on the one hand and to the workhead drive box on the other.

THE TEMPLATE SPINDLE carrying a worm wheel runs in an eccentric bush which can be rotated within the range of its bore in order to eliminate the play between the worm and worm wheel. The eccentric bush is arranged in the left-hand part of the bed. Templates, the strokes of which are transmitted to the cam being ground at a ratio of 1 : 1, are fixed to the head of the spindle.

THE WORKHEAD DRIVE BOX is bolted to the rear of the slide. The rotary movement is transmitted from the drive box through spur-gears, a flexible coupling, a set of pulled bevel gears and a worm to a worm wheel on the work spindle.

THE WORKHEAD. The work spindle has 8 rates of rotary feed which are engaged by 2 levers arranged at the top of the feed box cover. When the lower lever is disengaged by the lever at the front of the slide the spindle may also be rotated by hand by means of a crank. The large indexing ring on the shaft of the crank is graduated in 5 minute divisions. One revolution of the crank gives the spindle with the cam, which is being machined, a rotary movement of 5°. The spindle runs in Timken bearings the play of which if any is easily to take up.

The work spindle carries two centering points, one for working with the spindle in its horizontal position, i. e. for grinding cams, oval and face cams and the other for working with the spindle in its vertical position, i. e. for grinding cylindrical cams. For this purpose the plates are provided with T-slots arranged at a distance of 90° from each other. The workhead spindle can easily be removed for the purpose of reversing, by means of a hand crank.

The [illegible] can be reduced to nil by means of a [illegible] between the worm and the worm wheel to be reduced to a minimum.

The slide [illegible] by a hand crank. The large indexing ring on the shaft of the crank is graduated [illegible] divisions and facilitates correct setting of the grinding depth. One revolution of the [illegible]

THE WHEEL SLIDE [illegible] is arranged on the column and is balanced by a counter-weight inside the [illegible]. The slide can be moved for adjustment by hand by means of a large wheel [illegible] stone pawl and ratchet. During operation the pawl is disengaged [illegible] by means of a lever with the rising and dropping shape of the rotating template. [illegible] arranged to slide up and down. The motor pulley drives the [illegible] by means of a flat belt. The sliding arrangement of the electric [illegible]

[illegible] bracket is bolted to the slideways of which carry a cast iron bracket with the [illegible] T-bolts inserted into T-slots. The copying roller runs on needle [illegible]

The roller is coarsely adjusted for height in relation to the template by moving the cast iron bracket up or down. The accurate adjustment is made and the depth of cut set by means of a crank, a pair of bevel gears and a screw. The indexing ring on the shaft of the crank has 0.02 mm (approximately 0.0008") divisions. One revolution of the crank alters the distance between the roller and the wheel spindle by 1 mm (approximately 0.16").

The centre-line of the roller is aligned with the engraved line on the template by a special setting bar. The roller with its holder can be moved sideways on the cast iron bracket, when the fixing bolts are loosened, by set screws at the sides of the roller holder. The grinding wheel can be adjusted for height in relation to the cam being ground with an accuracy of 0.1 mm (0.004") by reading the movement on a scale with a vernier and a magnifying glass arranged on the upper part of the wheel slide.

LUBRICATION. The feed-box and the bearings of the gears in the bed are centrally lubricated by a piston oil pump driven by a cam in the feed box. The gears in the bed, drive box and headstock run in an oil bath. The wheel slide, and the bed and column ways are lubricated by hand by means of a grease gun. The wheel spindle is lubricated by hand.

COOLING ATTACHMENT (supplied only on special order at an extra charge). A coolant tank is formed at the rear of the bed. An electric motor-driven pump delivers the coolant through pipes with joints, a cock and a nozzle to the work. The used coolant and the chips are collected either in a separate vessel or in a two-part pan depending on the position of the workhead spindle. In the overflow tank incorporated in the coolant tank inside the bed the chips are separated from the returning coolant. If the customer does not order the cooling equipment with the machine, he can order it later at any time and easily fit it to the machine after unscrewing and removing the special cover plates.

THE DUST EXHAUST ATTACHMENT (supplied only on special order at an extra charge). A centrifugal separator with a fan fitted underneath the machine exhausts, by means of a nozzle and pipe line, the fine chips and dust produced by grinding and thereby improves the working atmosphere.

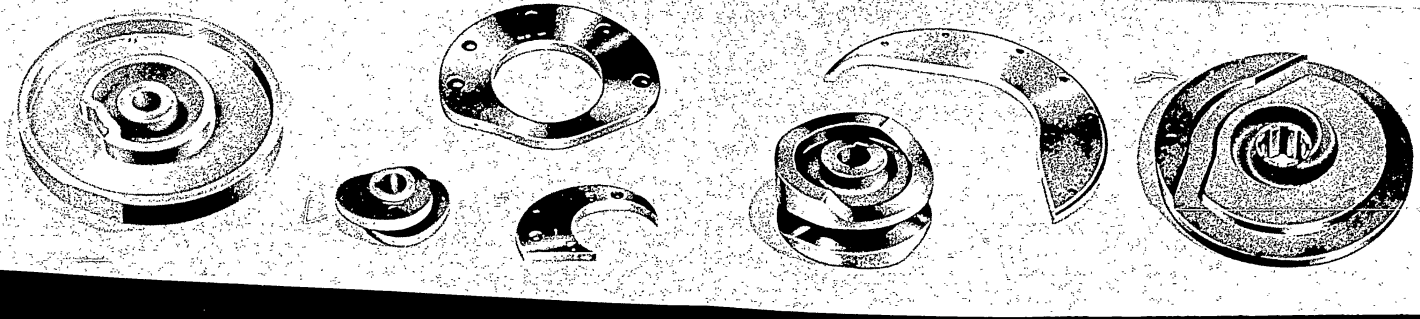
ELECTRICAL EQUIPMENT. The electrical equipment cabinet is suspended on the left-hand side of the column. It includes, among other items, a switch for reversing the wheel spindle rotation, a switch for the motor driven coolant pump and a light switch. The switches for the feed box and wheel slide motors are arranged at the top of the wheel slide within comfortable reach of the operator.

We normally supply motors to suit three phase, 50 cycles, 380/220 Volts and electrical equipment for three phase 50 Volts as stated to ESC standard specifications. In case the customer requires a machine with electrical equipment designed for a different system of electric power or in accordance with different standard specifications we can supply it at a charge for the difference in cost.

THE OPERATION OF THE MACHINE is simple and made easy by clear, conveniently arranged [illegible]

STANDARD EQUIPMENT (supplied with the machine, the price being included in the price of the machine). [illegible] the maintenance and operation of the machine - table for finished parts - 2 setting bars - clamping screw for the wheel - [illegible] wheel truing device - operating instruction booklet.

OPTIONAL EQUIPMENT (supplied only on special order at an extra charge). Dust exhaust attachment - [illegible] attachment.



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SPECIFICATION

BEK 80

PRINCIPAL DATA AND DIMENSIONS:

Grinding capacity of the machine:			
peripheral and face cams up to a diameter of	approx. mm	800	32"
cylindrical camps up to a diameter of	approx. mm	750	30"
Maximum rise of machined lobe	approx. mm	300	12"
Ratio of template spindle speeds to headstock spindle speeds		1 : 1	
Maximum pitch angle of template		35°	35°
Distance, centre-line of template spindle to centre-line of work spindle in horizontal position	mm	506	20"
Diameter of template spindle head	mm	140	5 1/2"
Height of centre-line of template spindle above floor	approx. mm	465	18 1/4"
Range of diameters of templates being used	mm	150 to 750	6" to 30"
Thickness of templates being used	mm	12 to 15	1/2" to 3/4"
Diameter of copying roller, standard	mm	30	1 3/16"
Maximum/minimum distance, end of wheel spindle to front clamping plate with workhead spindle in horizontal position	mm	510,0	20"/0
Maximum/minimum distance, end of spindle to centre-line of workhead spindle in vertical position	mm	540/180	21 1/2"/7"
Width of bed-ways	mm	400	16"

SLIDE AND WORKHEAD:

Longitudinal travel of slide on bed	mm	510	20"
Height of centre-line of workhead spindle above bed-ways	mm	413	16 1/2"
Number of rates of rotary feed of workhead spindle		8	
Range of rates of rotary feed workhead spindle:			
1 revolution of workhead takes	min.	3.4—2.3	
Taper in both ends of workhead spindle	Morse No.	5	
Bore of workhead spindle	mm	37.5	1·47"
Diameter of clamping plates	mm	350	14"

WHEEL SLIDE:

Vertical travel of wheel slide on column	mm	600	24"
Speed of wheel spindle in either direction	r. p. m.	15 000/11.250	
Taper in wheel spindle	Morse No.	1	

DRIVE:

Electric motor of feed box 900 r. p. m.	kW	0.7	
Electric motor of wheel slide, 2800 r. p. m.	kW	0.95	
Electric motor driven pump 2800 r. p. m., 20 litres per minute (on special order at an extra charge)	kW	0.125	
Electric motor of dust exhaust attachment 2800 r. p. m. (on special order at an extra charge)	kW	0.95	

DIMENSIONS AND WEIGHTS:

Dimensions of machine	approx. mm	2250 × 1180 × 2285	90" × 47" × 91"	
Net weight of machine with standard equipment and motors	approx. kg	2800	lbs	6150
Weight of feed box motor	approx. kg	25.5	lbs	56
Weight of wheel slide motor	approx. kg	12.5	lbs	28
Weight of electric motor driven pump	approx. kg	11	lbs	24
Weight of electric motor for dust exhaust attachment	approx. kg	13	lbs	29
Weight of railway packing	approx. kg	210	lbs	463
Weight of seaworthy packing	approx. kg	390	lbs	858
Dimensions of railway packing	approx. cm	236 × 130 × 240	90" × 50" × 90"	
Contents boxed	approx. cu. metres	6.5	cu. feet	200

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

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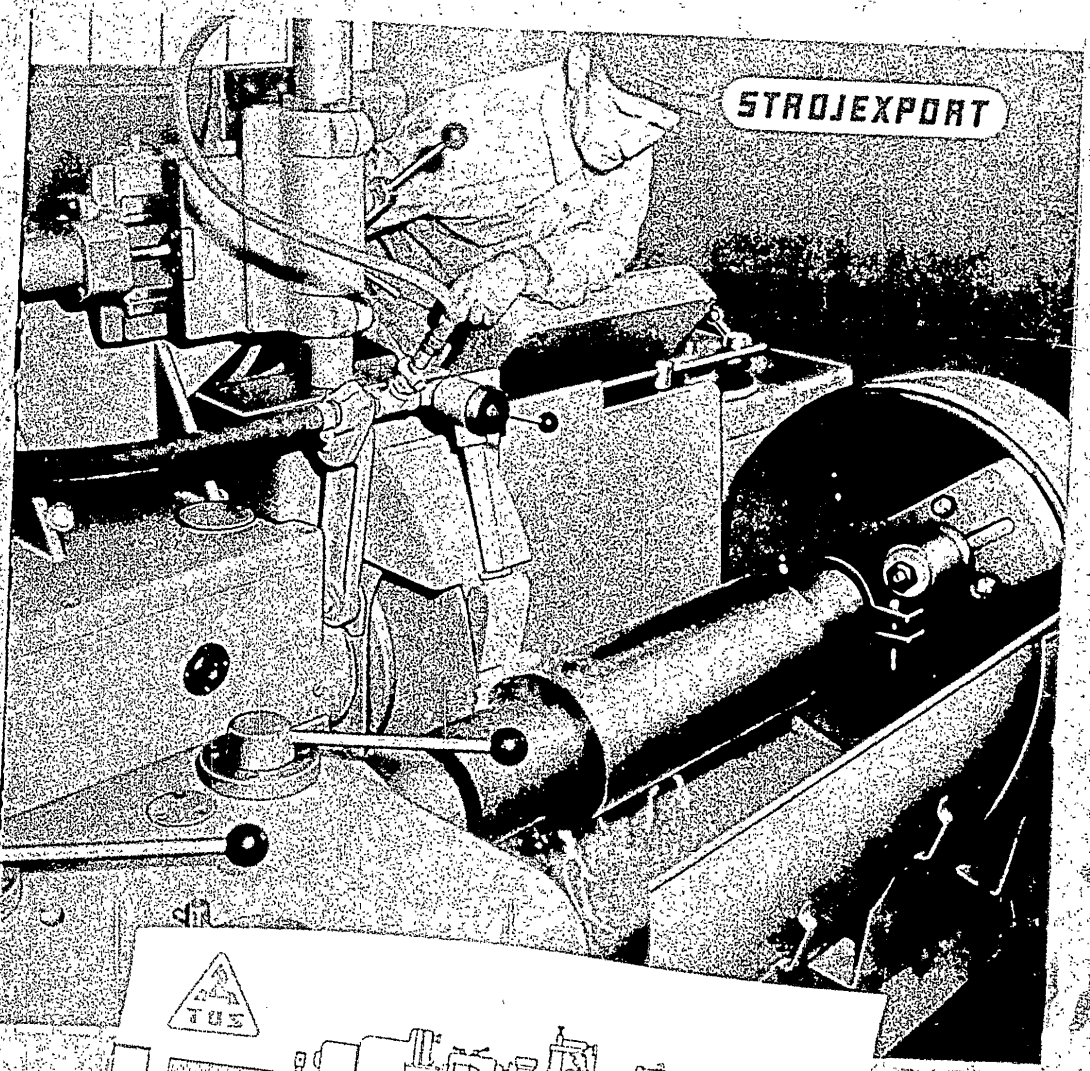

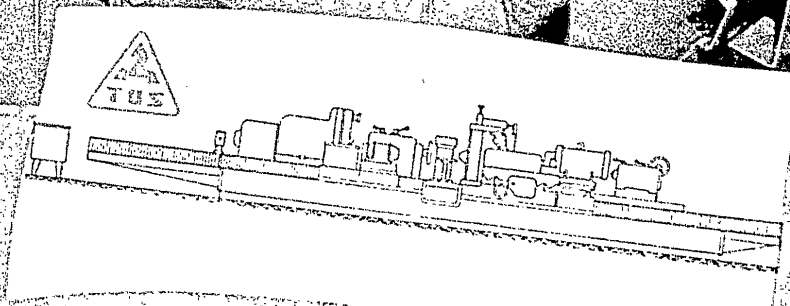

ROLL GRINDING MACHINE *Type* 80

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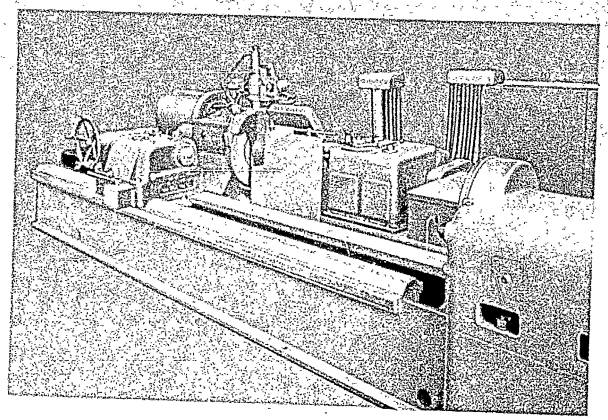


The machine is intended for the grinding of rolls of rolling mills and of the journals of rolls. The rolls are ground either accurately cylindrically or convex or concave with a high grade bright finish. Rolls of smaller dimensions and weights are ground between the centers of the workhead and tailstock. Large heavy rolls are ground supported by rests under the journals.

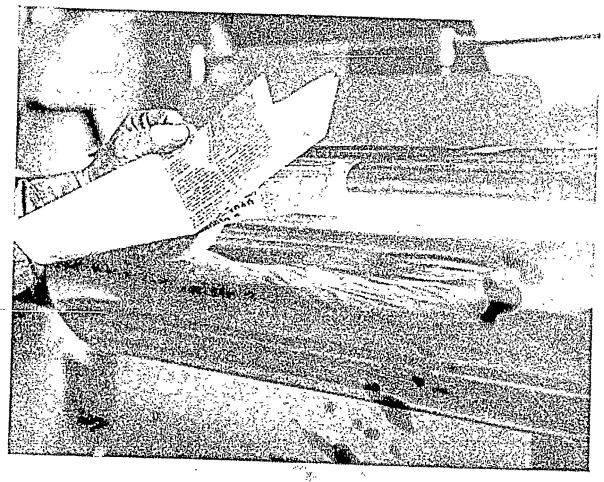
Outstanding Features

- The rigid design of the machine permits the maximum accuracy of grinding and the best grade of finish to be achieved together with a lasting precision of the machine.
- A minimum of vibration, not exceeding 1 μ, is achieved by careful balancing of all rotary parts. This results in a high grade precision surface with a high gloss being attained.
- The arrangement of the operator's post and remote control of all the movements of the machine makes work on the machine comfortable and highly productive.
- The choice of various kinds of speeds of the wheel spindle affords the possibility of selecting the cutting conditions best suitable for high gloss grinding
- The machine has a high output.

Bed. The bed of the machine consists of two mutually firmly joined parts. It rests on cast iron plates with wedge shaped slides for accurate erection and levelling. The front part of the bed carries the firmly mounted workhead. The tailstock is moved on guideways by means of a driving pinion and locked by a spur engaging with the teeth. The guideways of the front part of the bed also serve for attaching the rests and centre grinding attachment. The rear part of the bed has prismatic and straight guideways for the longitudinal feed of the wheelhead slide. These guideways are well covered by bellows for protection against dust and impurities. The upper part of the rear bed forms an oil tank for the lubricating and hydraulic systems. The space between the front and rear parts of the bed forms a coolant discharge trough.

Longitudinal Feed of Wheelhead. The wheelhead rests on a carriage with which it travels during grinding along the roller. Its longitudinal feed has 8 speeds, being driven by a four-speed motor and gear box the pinion of which engages with a rack joined to the rear bed. The reversal of the slide is controlled by stops of a rotary disc which provide an impulse for the hydraulic operation of the multi-plate clutch

Wheelhead. The wheel spindle has surface hardened and lapped journals running in plain bearings. The bearings are of special design and permit adjustment to the minimum clearance necessary for accurate operation of the spindle for high surface finish grinding. The bearings are lubricated with pressure oil supplied by a pump which is driven by its own electric motor, mounted separate from the wheel spindle box. The lubricating system is safeguarded against breakdown in such a way that the wheel spindle motor cannot be started unless the electric pump motor has been started and the lubricating oil pressure in the delivery piping has risen to the set figure. The lubricating oil is cleaned by a lamination type oil cleaner. The electric motor of the wheel spindle has four speeds. The wheelhead is fitted with a device for dynamic balancing during operation



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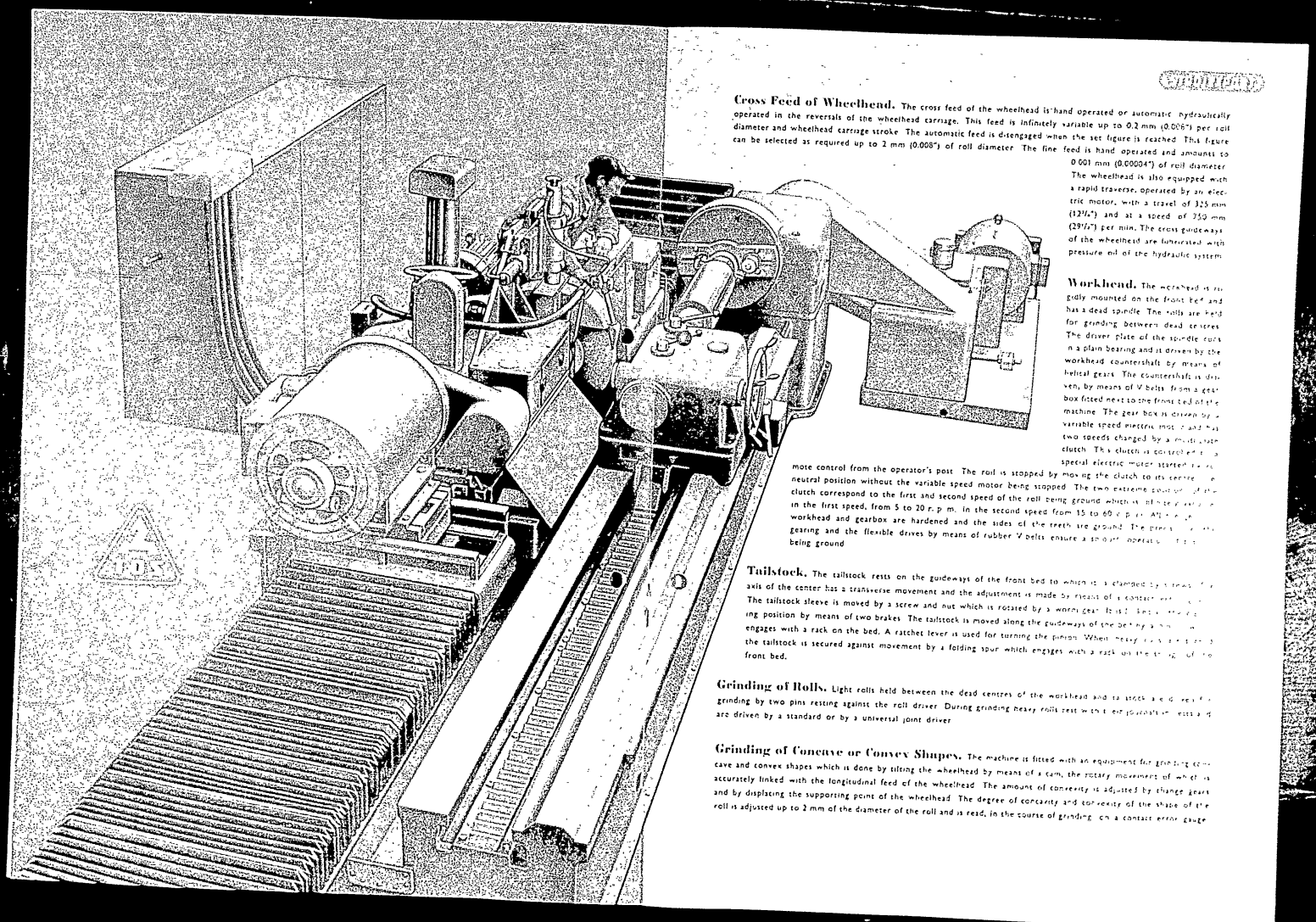

Cross Feed of Wheelhead. The cross feed of the wheelhead is hand operated or automatic hydraulically operated in the reversals of the wheelhead carriage. This feed is infinitely variable up to 0.2 mm (0.006") per roll diameter and wheelhead carriage stroke. The automatic feed is disengaged when the set figure is reached. This figure can be selected as required up to 2 mm (0.008") of roll diameter. The fine feed is hand operated and amounts to 0.001 mm (0.00004") of roll diameter. The wheelhead is also equipped with a rapid traverse, operated by an electric motor, with a travel of 325 mm (12¾") and at a speed of 750 mm (29½") per min. The cross guideways of the wheelhead are lubricated with pressure oil of the hydraulic system.

Workhead. The workhead is rigidly mounted on the front bed and has a dead spindle. The rolls are held for grinding between dead centres. The driver plate of the spindle runs in a plain bearing and is driven by the workhead countershaft by means of helical gears. The countershaft is driven by means of V belts from a gear box fitted next to the front bed of the machine. The gear box is driven by a variable speed electric motor and has two speeds changed by a multi-plate clutch. The clutch is controlled by a special electric motor starter for remote control from the operator's post. The roll is stopped by moving the clutch to its central neutral position without the variable speed motor being stopped. The two extreme positions of the clutch correspond to the first and second speed of the roll being ground which is infinitely variable in the first speed, from 5 to 20 r. p. m. in the second speed from 15 to 60 r. p. m. All the gears in the workhead and gearbox are hardened and the sides of the teeth are ground. The gearing and the flexible drives by means of rubber V belts ensure a smooth operation of the roll being ground.

Tailstock. The tailstock rests on the guideways of the front bed to which it is clamped by a lever. The axis of the center has a transverse movement and the adjustment is made by means of a contact screw. The tailstock sleeve is moved by a screw and nut which is rotated by a worm gear. It is set in the working position by means of two brakes. The tailstock is moved along the guideways of the bed by a pinion which engages with a rack on the bed. A ratchet lever is used for turning the pinion. When heavy rolls are ground the tailstock is secured against movement by a folding spur which engages with a rack on the top of the front bed.

Grinding of Rolls. Light rolls held between the dead centres of the workhead and tailstock are driven for grinding by two pins resting against the roll driver. During grinding heavy rolls rest with their journals on rests and are driven by a standard or by a universal joint driver.

Grinding of Concave or Convex Shapes. The machine is fitted with an equipment for grinding concave and convex shapes which is done by tilting the wheelhead by means of a cam, the rotary movement of which is accurately linked with the longitudinal feed of the wheelhead. The amount of concavity is adjusted by change gears and by displacing the supporting point of the wheelhead. The degree of concavity and convexity of the shape of the roll is adjusted up to 2 mm of the diameter of the roll and is read, in the course of grinding, on a contact error gauge.

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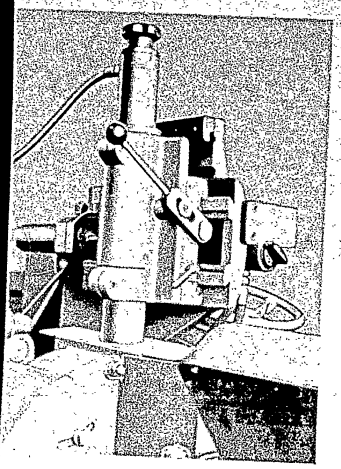
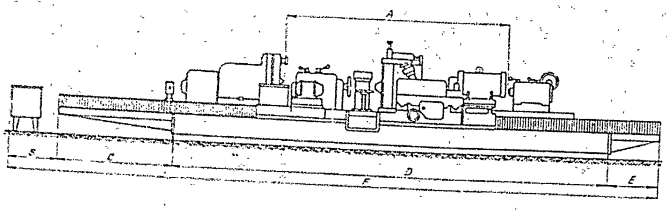


Trueing of Grinding Wheel. The machine is fitted with two trueing devices for the trueing of the grinding wheel. A fixed trueing device is attached to the tailstock and serves for direct trueing for the grinding of accurately cylindrical shapes. On the wheelhead, a trueing device with hydraulic feed is fitted which serves for straight-line and curved trueing of the grinding wheel for the grinding of concave and convex shapes. The shape of the grinding wheels is copied from a template. The point of the trueing diamond is abundantly cooled with a coolant supplied by a tube in the sleeve of the trueing device.

Rests. Two pairs of rests of very rigid design are supplied with the machine: Smaller, three-jaw rests serve for diameters of 150 to 350 mm (5 29/32" to 13 25/32"), larger, two-jaw rests with lubrication of the journals, serve for journal diameters of 350 to 500 mm (13 25/32" to 19 1/2"). Each rest is further equipped with three sets of jaws, the bearing surface of which is lined with bearing metal. The jaws are adjusted by screws. For the centring of the roll contact error gauges are used which are mounted in holders on the rests.

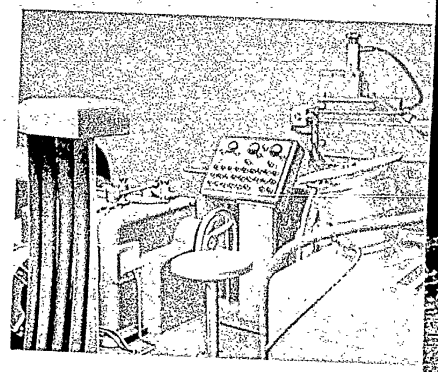
Cooling Equipment. The coolant tank is built into the foundation of the machine and provided with an outlet valve for discharge into the drain. The equipment is provided with settling chambers in the tank and with overflow riser with an electromagnetic cleaner and with a filtering tank with felt insertions so that a supply of pure coolant is assured which is necessary for grinding the surfaces of rolls to a high brightness. The coolant is supplied by a pressure pump with an electric motor and its pressure is controlled by a by-pass valve. During rough grinding the flow of coolant is led past the felt filter to prevent unnecessary clogging of its insertions.

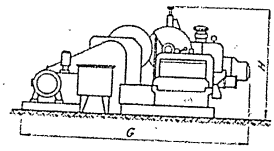


Electrical Equipment. All movements of the machine which are electrically driven are remote controlled from a control desk mounted at the operator's post. The machine is equipped with a variable speed electric motor for the drive of the work spindle and four-speed electric motors for the drive of the grinding wheel and for the longitudinal feed of the wheelhead carriage. These motors are dynamically balanced and have the rotor shaft running in plain bearings. The protective contactors, relays, fuses, main switch and all other switchgear are mounted in a switch box set up behind the machine opposite its centre. The connection of the switch box with the machine and with the control desk is arranged by means of freely suspended conductors enclosed in rubber hosepipes leading into a box on a column of the carriage. All the movements are mutually interlocked so that the electric motor of the wheelhead lubricating oil pump must be started first and only after it the other driving motors may be started. The electric wiring is arranged, from the point of view of safety, in accordance with the applicable regulations.

Standard Equipment: The standard equipment of the machine includes three grinding wheels with clamping flanges, an equipment for dynamically balancing the grinding wheel during operation, and a mercury vibroscope, a grinding wheel flange puller, a balacing arbour with nut, 2 centres (No. 5 Morse) 60°, 2 centres (No 5 Morse) 90°, 2 reducing sleeves No. 5 Morse to Metric 100, a lever with ratchet, two large rests with three sets of jaws, 2 small rests with three sets of jaws, a measuring plate for the levelling of the bed, a set of supporting plates for the erection of the bed, complete cooling equipment with electromagnetic and felt filtres, a set of coolant splash covers, a set of change gears, a switch box and a tool box, a set of spanners, a grease gun, operating instructions of the machine.

Optional Equipment: Centre grinding attachment with independent electric motor, universal joint driver (with coupling in accordance with drawing of roll), grinding wheel balancing stand, spot light, roll body gauges, gauge for setting the ground rolls on the rest, for the journal diameters of 150 to 350 mm (5 29/32" to 13 25/32"), 350 to 500 mm (13 25/32" to 19 1/2").





A	B	C	D
5000	750	1500	9167
16'5"	2'6"	4'11"	33'4"

E	F	G	H
1033	12450	4000	
3'5"	40'10"	13'2"	

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SPECIFICATION

Swing with 600 mm (24") dia. grinding wheel	mm	800	31 1/2"
Swing with 750 mm (29 1/2") dia. grinding wheel	mm	630	24 3/4"
Minimum grinding diameter (according to wear of grinding wheel)	mm	0 to 290	0 to 11 3/4"
Distance between centres	mm	4 000	13'2"
Grinding wheel (diameter × width × bore)	mm	750 × 80 × 305	29 1/2" × 3 1/8" × 12"
Diameter of worn grinding wheel	mm	460	18 1/8"
Journal diameter in small rest	mm	150 to 350	5 29/32" to 13 25/32"
Journal diameter in large rest	mm	350 to 500	13 25/32" to 19 5/8"
Taper in work spindle		Metric 100	
Taper in tailstock sleeve		Metric 100	
Maximum length of convex and concave grinding	mm	3 000	9'10"
Wheel spindle speeds, 4 steps	r. p. m.	445, 670, 890, 1325	
Speed of roll being ground, infinitely variable in two steps	r. p. m	15 to 60	
Cross movement of wheelhead	mm	325	12 3/4"
Speed of electric motor driven traverse of wheelhead, per minute	mm	750	29 1/2"
Longitudinal speed of carriage, 8 steps, per minute	mm	53, 80, 100, 160, 370, 570, 760, 1150	2 1/16", 3 1/8", 3 15/16", 6 1/4", 14 1/2", 22 1/2", 30", 45"
Longitudinal movement of wheelhead with power feed, referred to diameter	mm	0·0 to 2	0·0 to 0·08"
Power feed of wheelhead in reversals of carriage feed, referred to diameter	mm	0·0 to 0·2	0·0 to 0·008"
Minimum fine feed of wheelhead, referred to diameter	mm	0·001	0·00004"
Maximum concavity and convexity of rolls, referred to diameter	mm	2	0,08"
Maximum weight of roll being ground	kg	8 000	17 640 lbs
Total output of motors, approx.	kW	40	
Floor space required by machine (width × length)	metres	4·0 × 10·9	13'2" × 36'1"
Weight of machine with standard equipment, approx.	kg	38 000	83 780 lbs

Please state in your order the voltage available for electric motors

The particulars in the prospectus are not binding in detail

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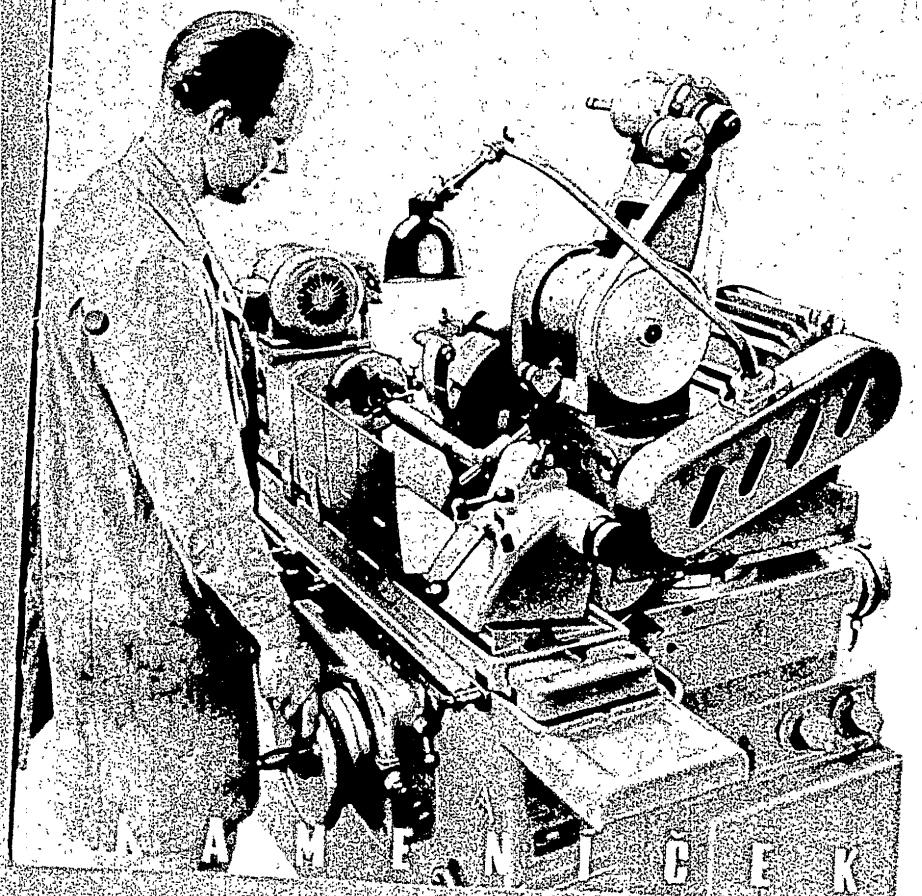
UNIVERSAL

Grinding Machines



TOS

KAMENICEK

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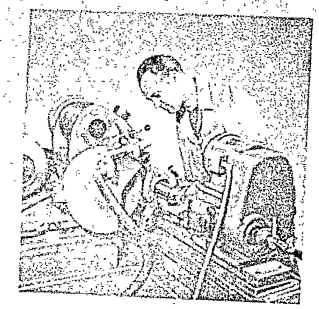
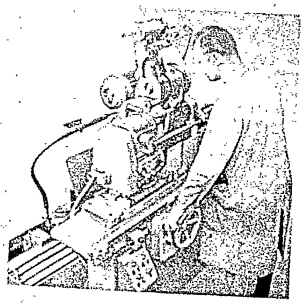
Universal Grinding Machines





are heavy duty precision machines equipped with a hydraulic table traverse and a hydraulic infeed. The machines are suitable for cylindrical, surface and internal grinding, both longitudinal and infeed. The setting of the grinding machines for the various operations is very easy and quick, so that the machines can be utilized economically for both single piece and multiple production.

The type 1U grinding machines have the hydraulic infeed operated only in the right hand table reversal and are not equipped with power cross feed of the wheelhead for infeed grinding.

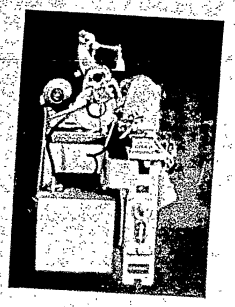
The type 2Uc grinders, the hydraulic infeed of which is operated in both table reversals or in one of them, depending on the setting, are supplied designed with power cross feed for infeed grinding and the models with lengths between centers of 750 mm and 1000 mm (29 1/2" and 39 11/32") are fitted with a hydraulic tailstock.

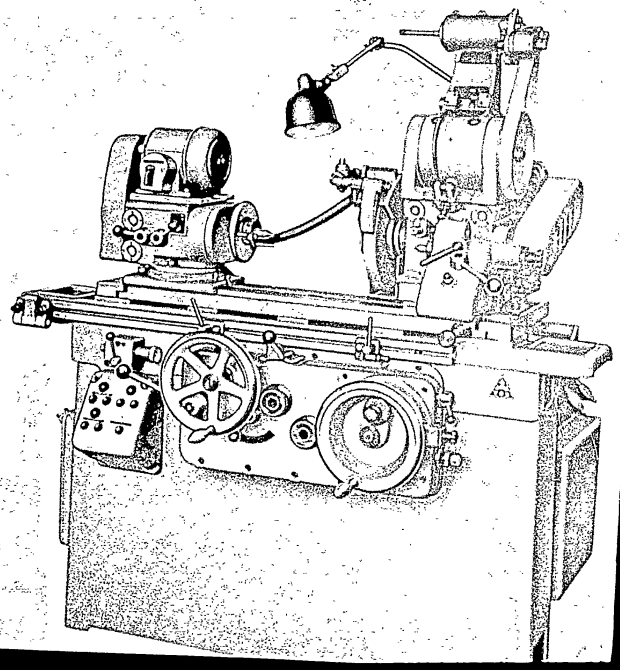
KAMENIČEK

Description:

THE WORKHEAD is arranged for grinding between dead centers or in a chuck. The workhead can be swivelled 90° for surface grinding and the workpiece can be fixed to a magnetic chuck. The spindle, which is made of nitriding steel, is mounted in adjustable plain bearings.

THE WHEELHEAD swivels and on type 2Uc grinding machines it is equipped with hydraulic rapid traverse in either direction. The spindle is mounted in adjustable plain bearings and driven by an independent electric motor. The machine is also supplied with a folding internal grinding attachment on the wheelhead which is driven by an independent electric motor by means of an endless woven belt.





1u

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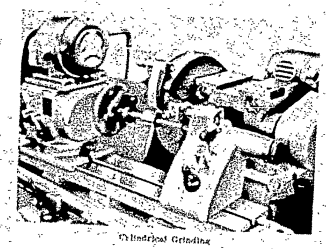
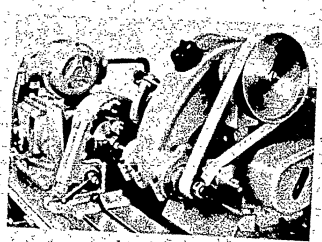


Cylindrical Grinding



Internal Grinding

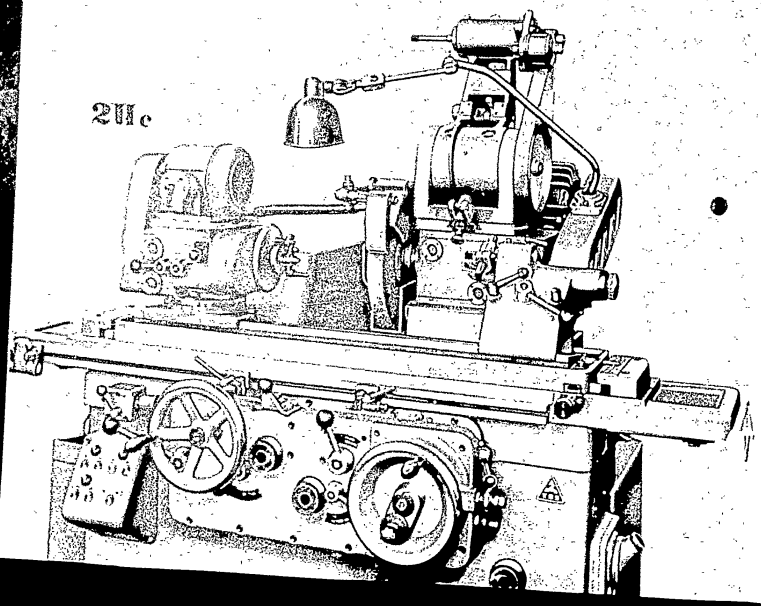
THE TABLE consists of two parts. The lower part is mounted in a prismatic and in a flat guideway of the bed, the upper part may be swivelled in accordance with a scale for grinding tapers. The hydraulic table feed can be limited by stops which have a coarse and a fine adjustment. The dwell in the reversals can be varied between 0 and 5 seconds. The oscillation of the table for infeed grinding is adjustable.

THE TAILSTOCK. The tailstock sleeve is moved by a hand lever. The pressure of the center against the workpiece can be adjusted as required by means of a spring. A micrometric diamond bracket is also fitted to the tailstock.

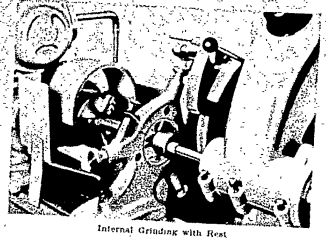
THE BED. The guideways of the bed are lubricated automatically. The lower part of the bed forms the oil tank of the hydraulic pump.

COOLING. The coolant pump is fitted next to the machine in a tank with settling stages.

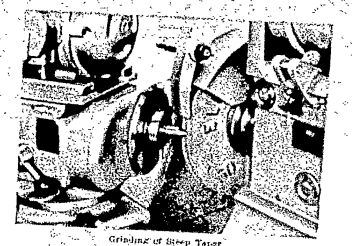
THE ELECTRICAL EQUIPMENT consists of the statically and dynamically balanced electric motors of the pump for the hydraulic system and for the coolant. The motors are equipped with protective contactors which are remote controlled by push-buttons.



Internal grinding spindles



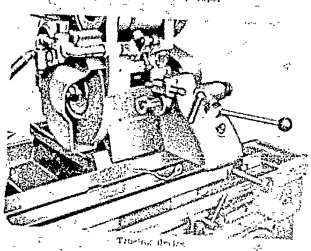
Internal Grinding with Rest



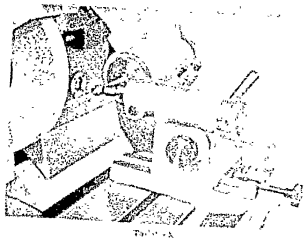
Grinding of Steep Taper

Standard Equipment and Accessories:

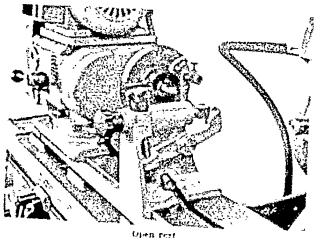
Universal workhead.
Three-jaw chuck, approx. 115 mm (4 1/2") dia.
Tailstock with lever control of tailstock sleeve.
Tailstock with hydraulic control of tailstock sleeve (only for type 2Uc machines with 750 or 1000 mm [29 1/2" or 39 11/32"] between centers).
Trueing device (without diamond).
2 centers.
Grinding wheel, 300×32×76 mm (11 13/16"×1 1/4" ×3") with balancing flange (for type 1U)
Grinding wheel, 350×40×127 mm (13 3/4"×1 9/16" ×5") with balancing flange (for type 2Uc).
Wheel puller.
Balancing arbor.
Wheelguard.
Extra belt pulley for worn grinding wheel (for type 2Uc only).
Open rest (for 1000 mm i. e. 39 11/32" between centers — 2 units).
Folding internal grinding attachment for 70 mm (2 3/4") dia. spindles with A 20 spindle.
Close rest for spindles up to 70 mm (2 3/4") dia.
Folding micrometer trueing device (table type) without diamond.
Micrometer stop for table traverse.
Set of drivers.
Coolant pump with piping and tank.
Set of splash guards.
4 electric motors for 380 Volts, 50 cycles.
Electrical equipment for 380 Volts, 50 cycles.
Set of belts.
Set of spanners.
Operating instruction booklet



Trueing device



Tailstock



Open rest

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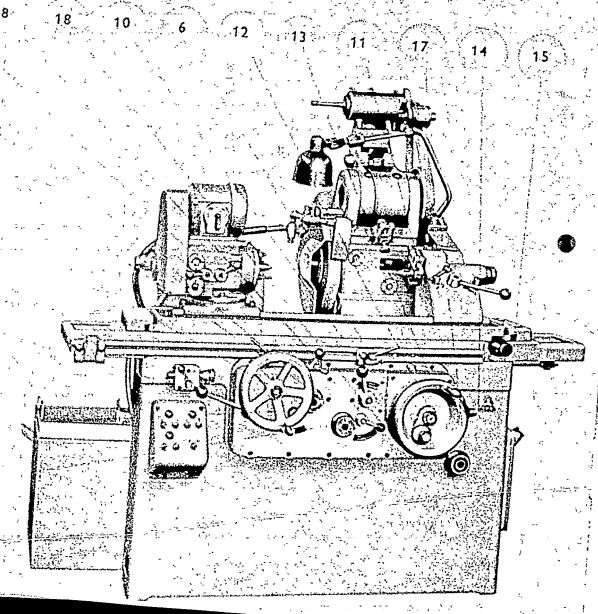
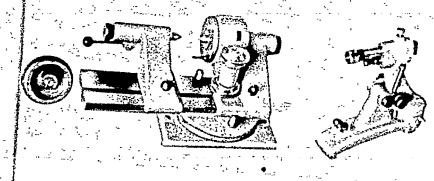
Layout of Controls:

1 Hand-feed micrometer stop.
2 Starting lever of hydraulic table traverse.
3 Speed control of table.
4 Hand wheel of table traverse.
5 Push-button for stopping of table during reversal.
6 Adjustable stops for limiting elevation of table.
7 Speed change lever of wheelhead.
8 Table traverse reversing lever.
9 Push-button for setting of type of feed of wheelhead toward workpiece.
10 Lever of rapid traverse of wheelhead, forward or reverse.
11 Diamond holder sleeve.
12 Feed brake.
13 Hand wheel for movement of grinding wheel toward workpiece.
14 Starting lever of power feed.
15 Screw for rotation of table.
16 Push-button box.
17 Push-button for softening of table reversal.
18 Lever for setting of rate of infeed.



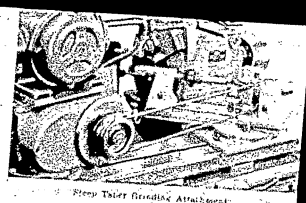
Optional Equipment:

Radius trueing attachment (without diamond).
Profile trueing attachment (without template or diamond).
Attachment for grinding steep tapers between dead centers; tapers up to 120°, 150 mm (5 7/8") dia., 140 mm (5 1/2") long.
Additional balancing flange for grinding wheel.
Balancing stand for grinding wheel.
Additional rest.
Collet chuck attachment with range from 3 to 12 mm arranged in 0.5 mm increments, including 1 collet.
Additional collets.
Additional spindles for internal grinding according to special specification.
Electromagnetic chuck, 150 mm (5 7/8") dia. with demagnetising switch.

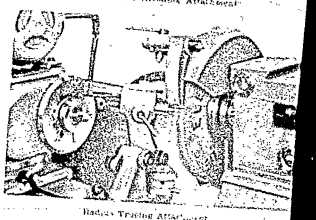


Rectifier for electromagnetic chuck.
Electric motor and electrical equipment for other voltages than 380 Volts, 50 cycles.
Lighting.

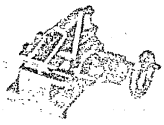
The attachment for grinding steep tapers consists of a rotary table on which the workhead and the tailstock of the attachment are fitted on a slide. The workhead is driven off the main workhead leather belt. The workpiece is held between the centers of the workhead and tailstock. Any apex angle up to 120° can be obtained by swivelling the table.
The profile trueing-attachment is also attached to the table and consists of a cross slide the top part of which moves crosswise and carries the sleeve with the diamond holder. This top slide is pressed against the template by a spring. The bottom slide affords a longitudinal movement controlled by a hand wheel by means of a screw.

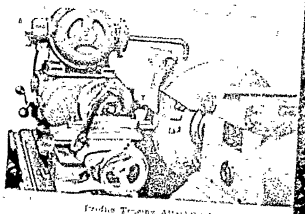


Steep Taper Grinding Attachment

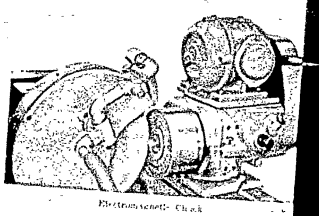


Radius Trueing Attachment





Profile Trueing Attachment



Electromagnetic Chuck

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SPECIFICATIONS

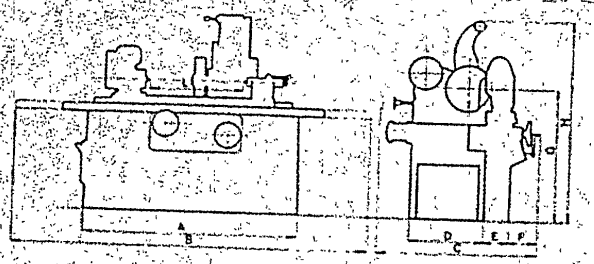
		1 U	2 Uc
Type		10 1-22"	11 7/16"
Maximum swing over bed		14 5/32"	19 21/32" 29 1/2" 39 11/32"
Maximum distance between centers		23 1/4"	23 1/4"
Maximum swing in rest		20"	23 1/2" 29 1/2" 32 5/8"
Maximum distance, internal spindle holder to scroll chuck			
Grinding Wheel			
Diameter × width × bore		11 13/16" × 1 1/4" × 3"	18 1/4" × 1 9/16" × 6"
Maximum width of grinding wheel		1 1/4"	1 31/32"
Workhead—Tailstock			
Taper in workspindle		No. 3 Morse	No. 3 Morse
Taper in tailstock sleeve		No. 2 Morse	No. 3 Morse
Swivel of workhead: forward/backward		90°/30°	90°/30°
Number of speeds of the workspindle		6	6
Workspindle-speeds		25—61—95—155—235—380	35—61—95—155—235—380
Motor: Speed	r. p. m.	1400	1400
Power	kW	0.37	0.37
Wheelhead			
Swivel of wheelhead in both directions		90°	90°
Transverse movement of wheelhead		5 1/8"	7 1/16"
Movement of wheelhead by rapid traverse		—	1 3/8"
Movement of wheelhead on slide		8 5/8"	8 5/8"
Power infeed in reversal of table, on dia		0.0002" to 0.002"	0.002" to 0.012"
Power infeed in plunge cut grinding, on dia		—	0.002" to 0.012"
Speed of new grinding wheel	mm/min.	1500	1640
Speed of worn grinding wheel	r. p. m.	2500	1050
Electric motor: speed	r. p. m.	2820	2830
power	kW	2	3
Table			
Swivel of table in either direction		7°	9° 7° 6°
Maximum taper, ground		1:4	1:3.5 1:4 1:5
Maximum longitudinal travel of table		19 21/32"	22 1/2" 31 1/2" 43"
Minimum longitudinal travel of table		0.01"	0.01"
Speed of table per min. (hydraulic), infinitely variable		0.001" to 0.20"	0.001" to 0.20"
Electric motor for hydraulic and coolant pump: speed	r. p. m.	1400	1400
power	kW	0.8	1.5
Internal Grinding			
Diameter of spindle for internal grinding		2 3/4"	2 3/4"
Electric motor: speed	r. p. m.	2800	2800
power	kW	1	1
Dimensions and Weights			
Floor space required: width		4'6"	4'10"
length		6'8"	7'6" 9'6" 12'
Weight of machine with standard equipment: net	lbs	3200	4080 4850 6040
shipping, railway packing	lbs	3310	4260 5070 5720
shipping, seaworthy packing	lbs	3750	4850 5730 6500
Dimensions of packing case: length		6'3"	6'3" 7'7" 9'8"
width × height		4'7" × 5'3"	4'11" × 5'7"

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

	1 U	2 Uc	
L	14,1	19,7	29,4 39,4
A	52	50,2	54 87,5
B	70	67	114 143,5
C	54	58	
D	24,6	24	
E	7,9	7,9	
F	11,8	9,8	
G	40,5	41,5	
H	60	64,5	

Dimensions in inches



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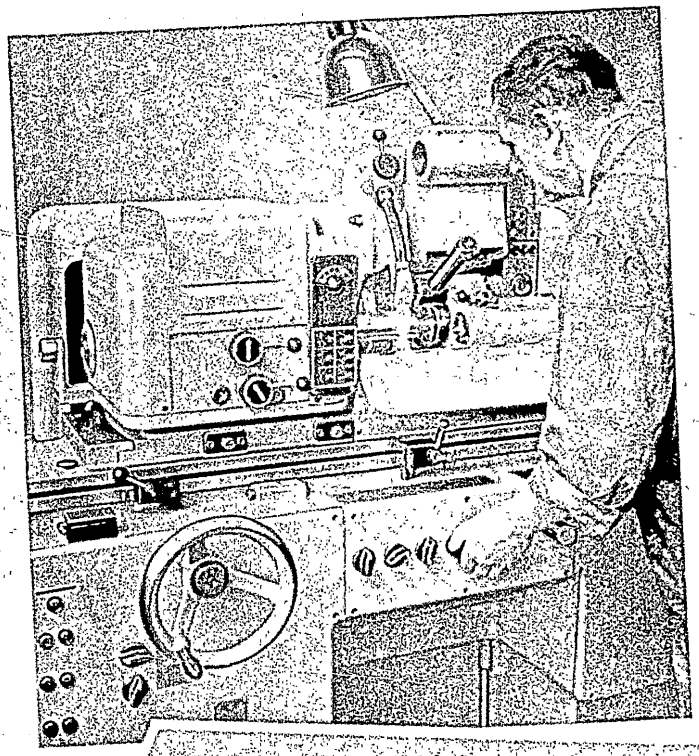
HYDRAULIC UNIVERSAL CENTER GRINDING MACHINE

with Automatic Work Cycle



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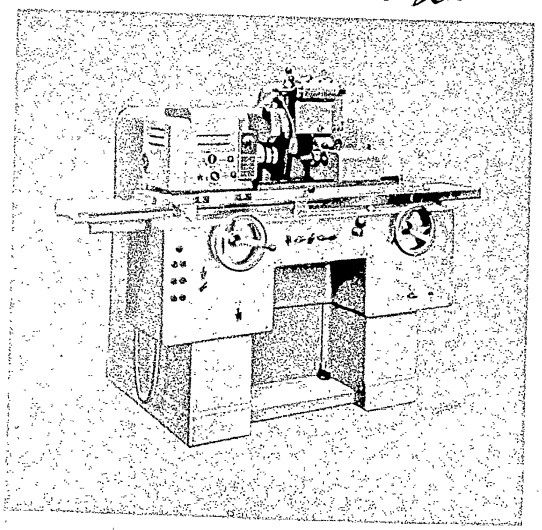
HYDRAULIC UNIVERSAL CENTER GRINDING MACHINE

with Automatic Work Cycle

20



The machine is intended for cylindrical, surface, internal, longitudinal as well as infeed grinding in both multiple and single production. What makes it particularly suitable for multiple production is the possibility of setting a work cycle on it. The operation of the machine then consists in removing the finished part, chucking a new part and starting the machine. All other operations are then done automatically. The machine is equipped, for the grinding of a smaller number of parts, with an adjustable stop for grinding to a set dimension (grinding to a positive stop). The automatic work cycle permits several machines to be operated simultaneously.

The Hydraulic Drive of the Machine consists of a pressure pump driven by its own electric motor, an overpressure valve, a distribution system and working cylinders on the lower table and on the wheelhead. The table is driven by hand or hydraulically. The speed of the table, in case of hydraulic drive, is infinitely variable from 0.05 to 4.5 metres (2" to 14'9") per minute. The table can be given, for truing of the grinding wheel by means of the diamond on the tailstock, a speed independent of the speed of the table for longitudinal grinding. The reversals of the table are carried out accurately and damped. The dwell of the table in the reversals is adjustable up to five seconds. The table stops either in both reversals or only in the reversal on the workhead side. The reversal of the table is operated by stops adjustable in a slot in the lower table. The stops have a screw for fine adjustment of the point of reversal. The starting and stopping of the movement of the table and for the reversal of the table in the course of work are controlled by the main starting lever even when the automatic work cycle is set.

The cross feed of the wheelhead is hand operated, fine and standard, and power operated up to a total feed of 5 mm (0.04") per diameter of the workpiece. The wheelhead also has a rapid traverse within a range of 17 mm controlled by the main starting lever.

With plunge cut grinding the infeed is infinitely variable and a part of the movement into the cut can be made at a higher speed. With longitudinal grinding the power feed can be set to operate in both or either traversal of the table. The cross feed has an adjustable stop which is used for the grinding of a smaller number of pieces to the same dimension.

The Automatic Work Cycle facilitates quick work in multiple production. The operation of [illegible] by means of control valves of the hydraulic mechanism and the operation of the machine then consists only in [illegible] of the finished workpiece, insertion of a new workpiece and starting of the machine by pushing the [illegible] lever. The stopping of the machine after the feed has reached the stop and after the finishing [illegible] is automatic. By the main starting lever the workhead, cooling equipment, rapid approach [illegible] power feed and longitudinal movement of the table are started by a single movement [illegible] grinding procedure are signalled by coloured lights which are fitted on the front side of the [illegible] ment of the quill of the tailstock can be hydraulically controlled only when the [illegible] that it will not be released by the pedal being accidentally depressed while grinding [illegible]

The Electrical Equipment consists of the statically and dynamically balanced [illegible] wheelhead and workhead and of the motor of the internal grinding spindle [illegible] lant and lubricating oil pumps. The motors are protected by contactors which [illegible] tons. The electric switchboard is fitted in the space on the rear side of the bed [illegible]

Standard Equipment

Three-jaw chuck of a diameter of approximately 116 mm (4½"), truing device holder [illegible] mond), 2 centers, grinding wheel with balancing flange, grinding wheel flange puller, [illegible] open rest, enclosed rest, folding internal grinding equipment, spindle for internal grinding [illegible] device on table (without diamond), micrometric stop for longitudinal movement of table, [illegible] cooling equipment, coolant splash guard, set of spanners, instructions for operation of machine

Optional Equipment

Radius truing attachment (without diamond), profile truing attachment (without diamond), further grinding wheel balancing flanges, collet chucking equipment for range of 3 to 16 mm including one collet, further collets (1 mm increments), electromagnetic chuck, 150 mm (5⅞") dia., with rectifier, lighting equipment, design of wheelhead with possibility of clamping grinding wheel flange also on right hand side of spindle for simultaneous grinding of cylindrical and axial surfaces, electrical equipment for other system of power than 350 Volts, 3 phase, 50 cycles, other internal grinding spindles, balancing stand, accessories for dynamic balancing of grinding wheel

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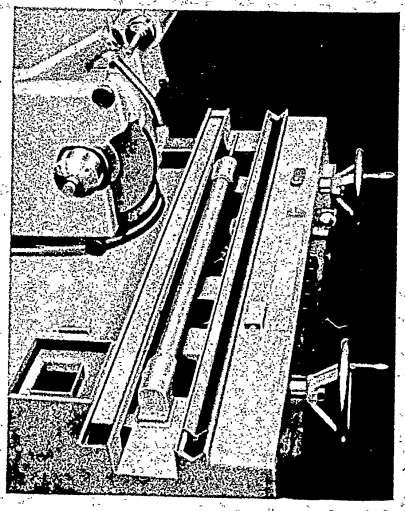
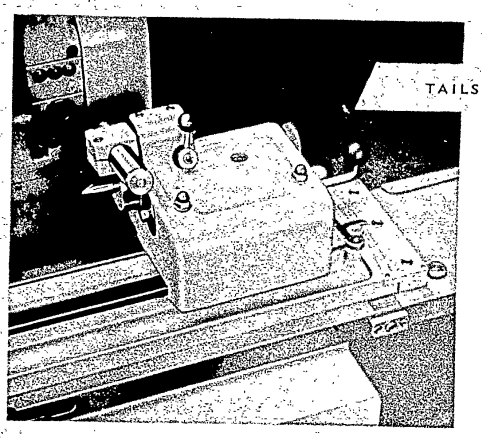
DESCRIPTION

The Bed of the machine is a solid piece with prismatic and flat guideways for the table and a flat surface for a rotary plate on which the wheelhead slides. The shape of the bed is adapted to a sitting position of the operator. In the bed are formed an oil tank of the hydraulic drive and a coolant tank.

The Tables. The machine has a lower table the prismatic and flat guideways as well as the top surface of which are ground and fitted into accurately scraped guideways of the bed. This permits a perfect oil film to be created. The lubricating oil is supplied by the pressure pump of the hydraulic system. The upper table has all the guideways ground and swivels on a pin for accurate alignment when cylindrical or tapered surfaces are to be ground. There is a coarse swivelling movement and a fine one by means of a micrometric screw in accordance with a scale.

The Workhead swivels on the surface of the upper table and is adapted to the grinding of tapers and flat surfaces. The spindle is hardened with the journals for the plain bearings finely lapped. It runs in a plain bearing, adjustable to a minimum of bearing play. The lubrication is automatic. The spindle is arranged for clamping of the workpiece in dead centers, in a chuck, in a collet chuck, or on an electromagnetic chuck. The spindle and driving plate are driven by V-belts from a six-speed gear box driven by an electric motor. The gears of the gear box have hardened and ground teeth. The spindle is mounted axially in a precision bearing which ensures accurate running with a minimum of out-of-trueness.





TAILSTOCK

The Tailstock has a hardened quill, accurately fitted, which is moved by a lever or by a hydraulically controlled pedal mounted in a recess in the bed. The pressure of the center against the center punch marks is produced by a spring, the force of which is adjustable by a screw. The hand wheel serves for the ejection of the center and for the adjustment of the stroke of the quill. The tailstock carries the bearing of the [illegible] diamond holder.

The Wheelhead swivels for the grinding of tapers. The spindle is hardened [illegible] in plain bearings, the bearing journals are finely lapped. The special [illegible] permits the play to be adjusted to a minimum and ensures smooth and [illegible] of the spindle. Also the thrust is carried by plain bearings. The wheelhead is moved crosswise by means of a pinion and rack. The play of the mechanism is eliminated mechanically. As an item of special equipment the wheelhead is arranged for the clamping of a grinding wheel on the right hand side which permits cylindrical and axial surfaces to be ground simultaneously.

The Internal Grinding Equipment is folding, fitted to the wheelhead. It is easy to set into its working position which permits external as well as internal grinding to be done with one clamping. The wheelhead is driven by its own electric motor by means of an endless woven belt. The drives of the internal grinding spindle and of the wheel spindle are, for the sake of safety, electrically interlocked so that the two drives cannot operate simultaneously. The electric switch is controlled by the folding movement of the arm of the internal grinding equipment.

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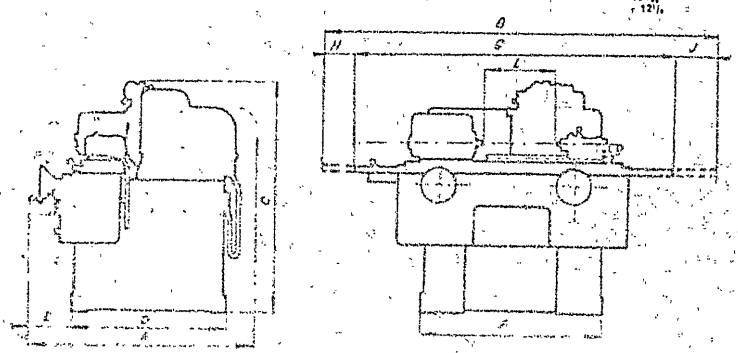
SPECIFICATION

Swing	mm	200	7 1/4"
Distance between centers	mm	450	17 1/8"
Grinding wheel (diameter × width × bore)	mm	350 × 32 × 127	13 3/4" × 1 1/4" × 5"
Diameter of form grinding wheel	mm	250	9 7/8"
Swing in open rest	mm	60	2 11/16"
Swing in enclosed rest	mm	60	2 11/16"
Taper in work spindle		No. 4 Morse	
Taper in tailstock quill		No. 3 Morse	
Diameter of chuck, approx.	mm	116	4 3/16"
Hole in sleeve for internal grinding spindle	mm	70	2 7/8"
Swivel of workhead		90°	
Swivel of wheelhead		60°	
Swivel of table away from grinding wheel		10°	
Swivel of table toward grinding wheel		9°	
Floor space required by machine (width × length)	metres	1.53 × 2.77	5'1" × 9'1"
Weight of machine with standard equipment	kg	1700	3750 lbs
Speed of wheel spindle	r. p. m.	1750, 2000	
Speed of work spindle - 6 speeds	r. p. m.	50, 80, 125, 225, 330, 500	
Maximum longitudinal movement of table	mm	830	32 5/8"
Minimum longitudinal movement of table	mm	1	0.04"
Transverse movement of wheelhead	mm	245	9 5/8"
Hydraulic rapid traverse of wheelhead	mm	19	23/32"
Speed of table, infinitely variable, per minute	metres	0.05 to 4.5	0.002" to 0.18"
Cross movement of wheelhead during power feed, referred to diameter	mm	1	0.04"
Power infeed in reversals of table, referred to diameter	mm	0.0 to 0.05	0.0 to 0.002"
Power infeed in plunge-cut grinding, referred to diameter, per minute	mm	0.0 to 3	0.0 to 0.12"
Total input of electric motors	kW	4.2	
Maximum weight of workpiece	kg	15	33 lbs

	A	B	C	D	E	F	G	H	J	L
mm	1530	2830	1465	973	280	1140	2000	260	260 – 310	450
inches	60 1/4	111 13/16	57 11/16	38 1/4	11	44 7/8	78 3/4	10 1/4	10 1/4 – 12 1/4	17 3/4



PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS

The particulars in the prospectus are not binding in detail

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

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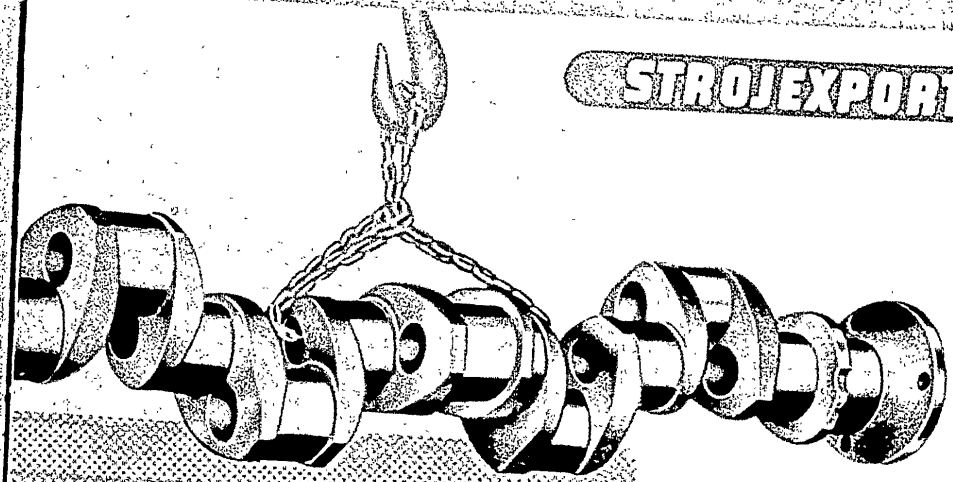
STROJEXPORT



CRANKSHAFT GRINDING MACHINE

BKD 130

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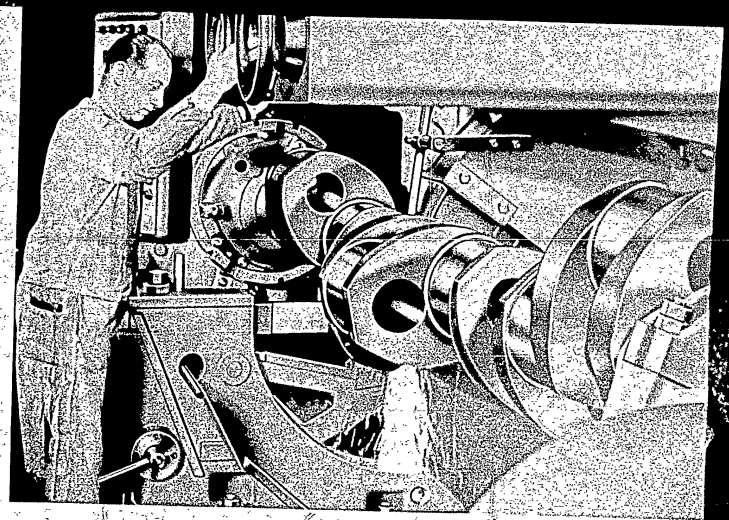
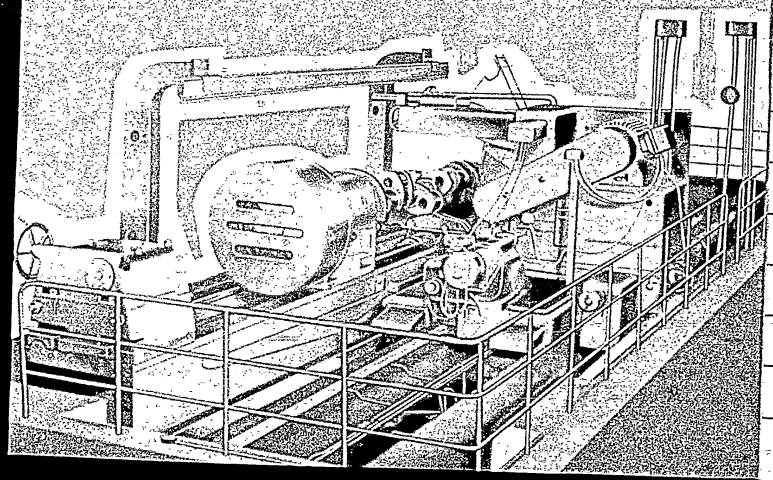
TOS

BUD 80

CRANKSHAFT GRINDING MACHINE

The machine is intended for precision grinding of large crankshafts and large shafts. The big end journals of crankshafts are ground with the crankshaft clamped in the chucking equipment of the main workheads. The main journals of crankshafts and large shafts are ground, clamped between the centres of the auxiliary workhead and tailstock.





Outstanding Features

- Easy operation by single worker made possible by centralization of all controls at operator's post.
- Easy resetting of crankshafts for grinding of next journal made possible by special mounting of main workhead chucks.
- Mechanization of all feeds and traverses which are operated hydraulically and by independent electric motors.
- Possibility of measurement of diameter being ground in course of grinding.
- High accuracy of grinding and quality of ground surface resulting from rigidity of machine.
- System of dual workheads permits quick change from grinding of big end journals to grinding of main journals without resetting and fitting of chucks.
- High output of machine.

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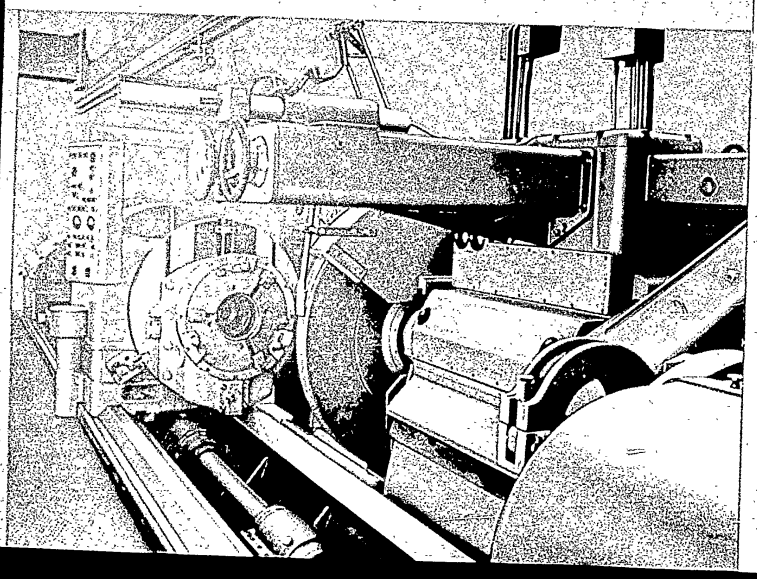
Machine Bed

The bed of the machine is of generous proportions and ensures the highest rigidity and thus also precision of work. It consists of two mutually separate sections. The front section forms the guideways of the main workheads and auxiliary workhead and tailstock. The rear section has a flat and a prismatic guideway for the wheelhead slide. These guideways are covered by sheet metal strips against the penetration of impurities. Both sections of the bed consist of three parts rigidly bolted together and secured by tapered pins. The two beds are divided into six parts for shipment.

The guideways are lubricated by independent pumps which supply oil to valves distributed along the guideways. As the wheelhead slide travels those valves are opened which are struck by the slide. The pressure of the lubrication is set to the most favourable figure at which the workhead slide is lightened to a permissible degree by a system of lubricating grooves arranged in a special way.

Both sections of the bed rest on supporting plates by means of which they are set to their correct position.

Gauge plates are supplied for the adjustment and check of the parallelism of the guideways of the beds with the machine.



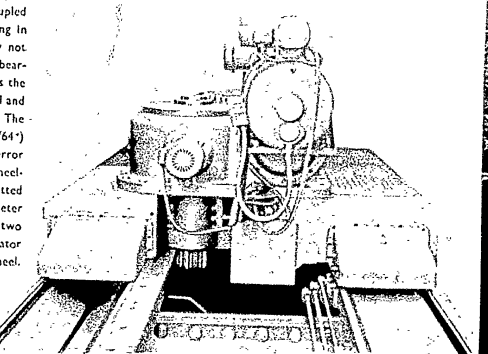
Wheelhead

The wheelhead is mounted on a slide travelling lengthwise. The longitudinal feed of the wheelhead slide is operated by a pinion and a rack attached to the rear bed.

The longitudinal feed is driven by an electric motor with infinitely variable speed and a two-speed gear box. It gives the wheelhead a range of longitudinal feeds of 19 to 1950 mm (3/4" to 77") per minute. The first, lower speed serves for trueing the grinding wheel and fine grinding at a rate of longitudinal feed of 10 to 195 mm (3/4" to 7 3/4") per minute. The second, higher speed is intended for rough grinding and travelling along the shaft at a speed of 195 to 1950 (7 3/4" to 77") per minute. The reversal of the longitudinal feed is controlled electrically by stops. The system of stops consists of a rotary cylinder and stops fitted on a horizontal bar. The cylinder is deflected by the stops and operates two pairs of microswitches for the left hand and right hand reversal of the wheelhead slide. One pair of switches operates the contactor of the reversing motor and the other serves as a safety device in case of a defect of the first pair. The stop cylinder and, with it, the longitudinal reversing movement of the slide can also be [illegible] by hand from the operator's post.

The wheel spindle is surface hardened and has polished journals. The bearings are plain, split and [illegible] by a separate electric motor driven lubricating oil pump. The oil delivered to the bearings passes through [illegible] tion type cleaner. The lubrication of the spindle is safeguarded against breakdown, on the one hand, electric [illegible] the wheel spindle motor cannot be started unless the oil pump motor is running, on the other hand [illegible] who watches, from his post, the flow of oil into each bearing in the sight glass on the bearing.

The wheel spindle is driven by an electric motor of an output of 34 kW by means of a belt pulley which is mounted independently in anti-friction bearings and coupled to the spindle by means of a coupling in order that the pull of the belts may not produce harmful pressures in the rear bearing of the spindle. The spindle carries the clamping flange with the grinding wheel and has a hand controlled axial movement. The total axial movement is 10 mm (25/64") and the operator watches it on the error gauge fitted on the front wall of the wheelhead. To the grinding wheel guard are fitted the equipment for measuring the diameter being ground in the course of work, two lamps and a mirror in which the operator watches the position of the grinding wheel.



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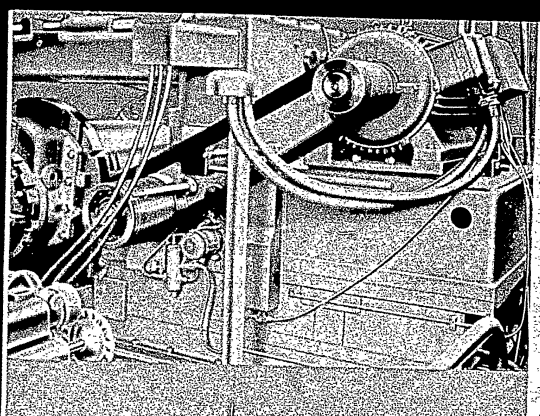


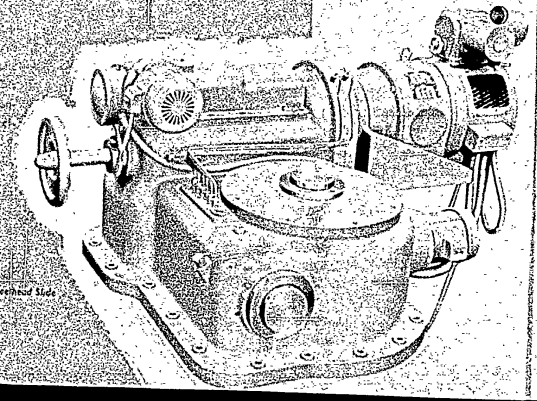
Wheel Spindle Drive

The cross feed of the wheel head

is hand operated, the [illegible] feed for plunge cut grinding being hydraulically infinitely variable. The amount of feed is indicated by [illegible] gauge of the measuring equipment fitted on the front surface of the wheelhead. The wheel[illegible] approach and withdrawal. Apart from that the wheelhead has a power cross [illegible] For side grinding, e. g. of the cranks of the crankshaft, a part of the rapid traverse [illegible] connected, at an infinitely variable speed of 5 to 200 mm (3/16" to 7 7/8") per minute.

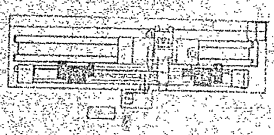
The [illegible] and of the axial feed of the spindle are fitted on an arm attached to [illegible] within easy reach of the operator.

[illegible] guide [illegible] particular [illegible] particular [illegible] by [illegible] motor [illegible] continuous approach of the wheelhead of 0.005 mm (0.0002").



Drive of Wheelhead Slide

Main Workheads

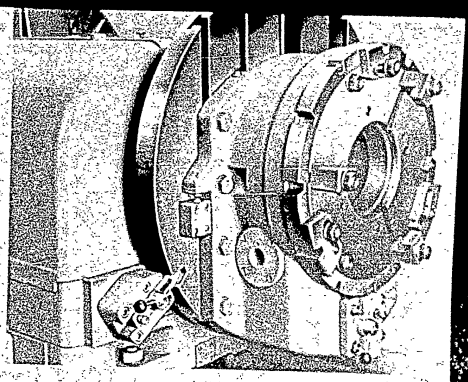


Two main workheads serve for grinding the big end journals of crankshafts. They are of rigid design and mounted on the front bed of the machine. Their movement on the guideways of the bed is power operated, each by its own electric motor, or hand operated by means of a ratchet lever and rack. The spindles, which are surface hardened, run in split plain bearings.

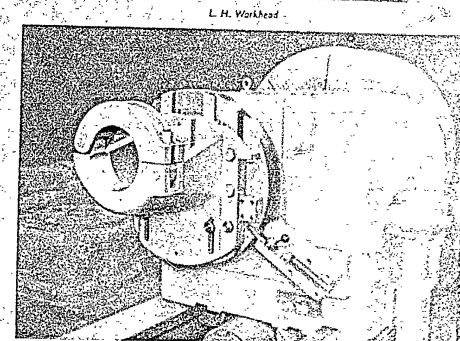
The spindles are driven by a chain from a spline six groove shaft mounted in the centre of the front bed. The sprockets of the drive shaft have a sliding movement on the shaft. An equal angle of setting of the work spindle is obtained by means of two adjusting couplings on the drive shaft.

The shaft is driven by a variable speed motor through a worm gear box. The speed of the shaft being ground is infinitely variable in a range of 5 to 50 r. p. m.

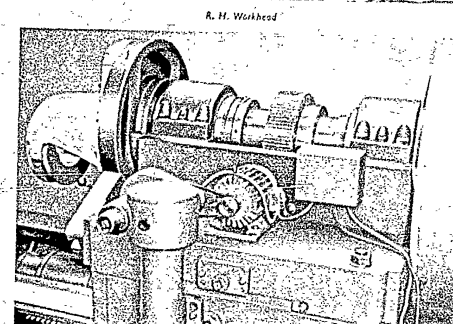
Drive of R. H. Workhead



L. H. Workhead



R. H. Workhead



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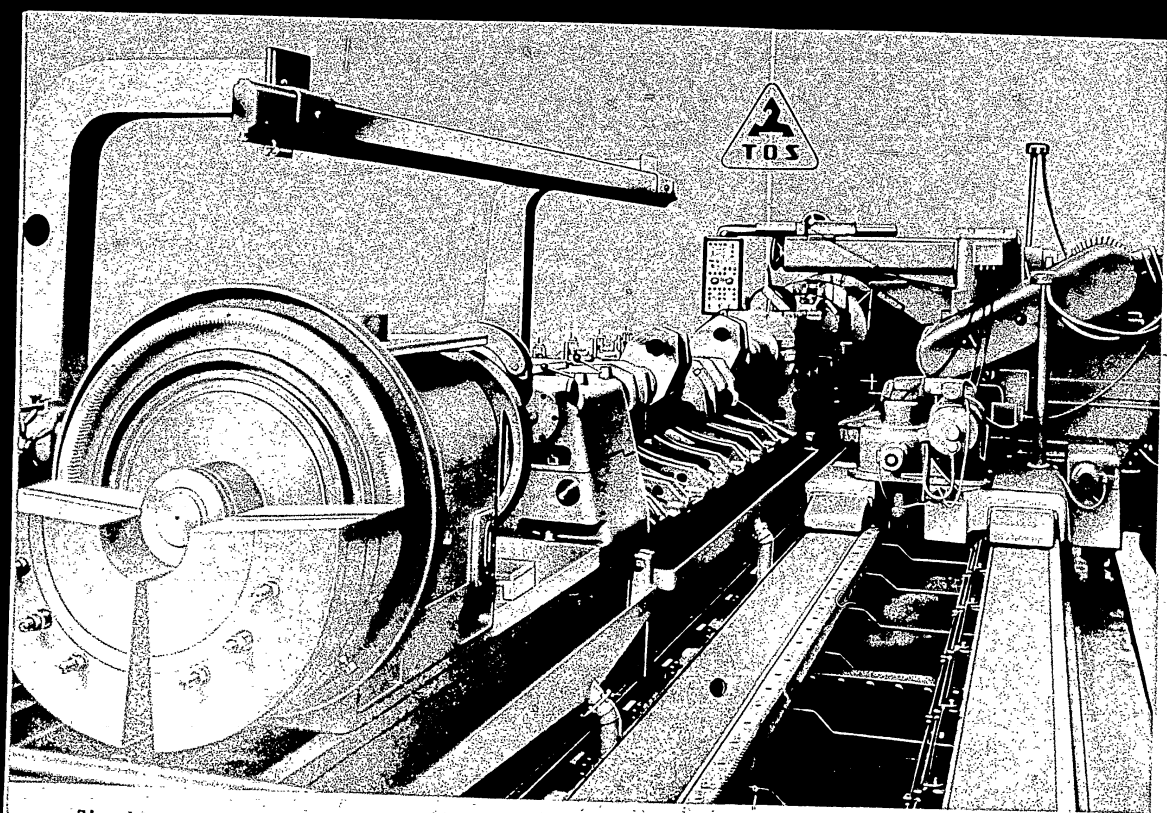
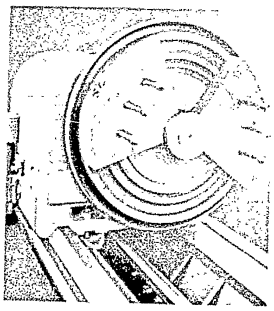


The balancing

of the eccentric mass of the crankshaft is effected with weights attached to the outer ends of the main work spindles. The selection of the size of the weights and the balancing is effected by turning the weight to a position in which, when the chucked shaft is rotated, the pointer of the ammeter connected into the circuit of the variable speed motor of the main workhead drive settles to a constant reading.



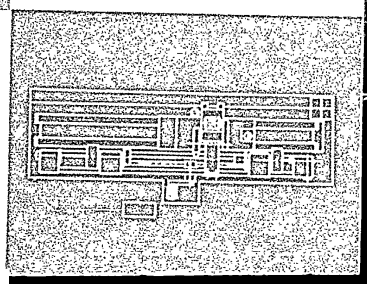
Chucking Equipment

This equipment is designed for a maximum eccentricity of crankpins of 250 mm (9 13/16"). The crankshaft is chucked, on the L. H. workhead, by a flange which is centered by its collar.
The chuck runs in a needle bearing so that the rotation of the heavy shaft, which is operated by a worm gear, requires no effort.
The R. H. end of the crankshaft is chucked by means of a split sleeve which is adjustable in accordance with the eccentricity of the crankpins. The eccentricity of the pins can be accurately set by means of a micrometer gauge or a slip gauge inserted between the fixed and moving fense of the chuck.

Type

BKD

Crankshaft Grinder



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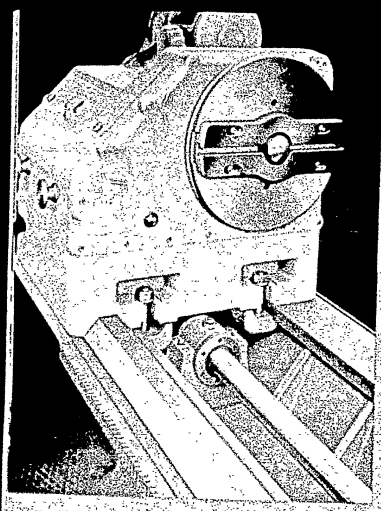
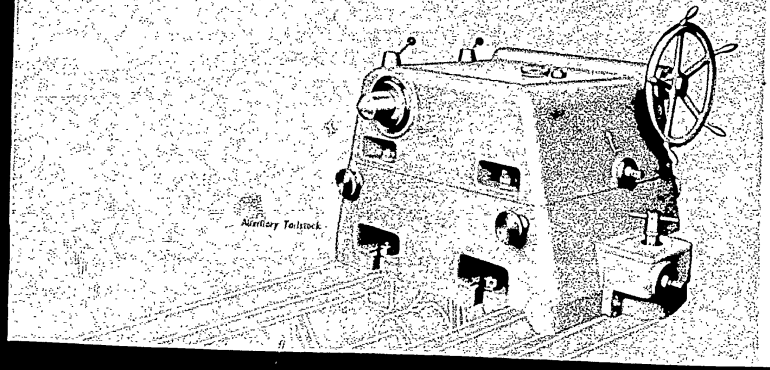


Auxiliary Workhead

The grinding of the main journals of crankshafts

is effected between the fixed centers of the auxiliary workhead and tailstock. For this grinding operation the auxiliary workhead and tailstock are put in place of the main workheads by being lifted, by means of a crane, from the edges of the front bed, where they were kept

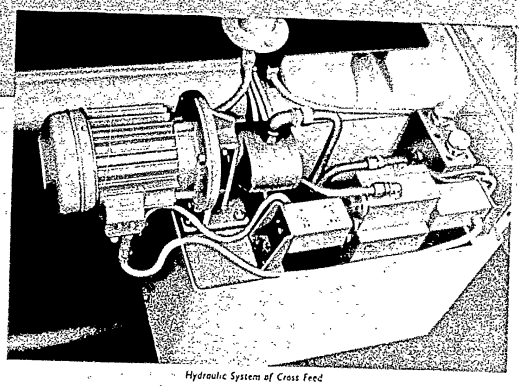
while the [illegible] and the main workheads are moved to the L. H. and R. H. end respectively of the [illegible] receives its movement from the driver of the auxiliary workhead which is [illegible] infinitely variable speed. The tailstock sleeve is moved by means of a nut [illegible] wheel by means of a worm gear. The tailstock sleeve is locked in the [illegible] of the auxiliary workhead and tailstock on the front bed is hand operated. The [illegible] being ground is infinitely variable within a range of 5 to 50 r. p. m.



Auxiliary Tailstock

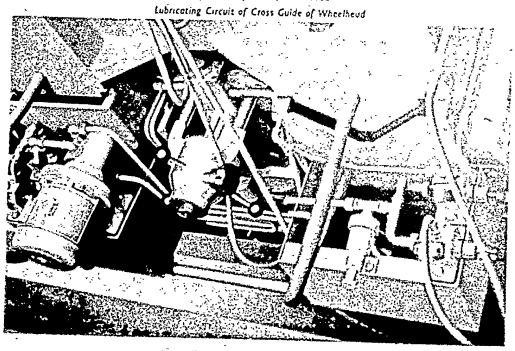
Cooling Equipment

The machine is equipped, for the grinding and truing of the grinding wheel, with a cooling equipment which consists of a tank built in the base of the machine and an inlet channel into which extends the suction branch of a pump driven by its own electric motor. The pump delivers 100 litres (22 Imp. gal.) of coolant per minute.



Hydraulic System of Cross Feed

Lubricating Circuit of Cross Guide of Wheelhead



The lubrication of the machine is divided into four independent circuits with independent pumps, each of which is driven by its own electric motor.

1st circuit: lubrication of rear bed

2nd circuit: lubrication of cross guide of wheelhead

3rd circuit: lubrication of wheel spindle

4th circuit: lubrication of gear box of longitudinal feed.

The drives and gear boxes are dip-lubricated.

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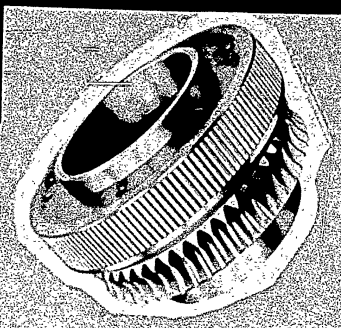
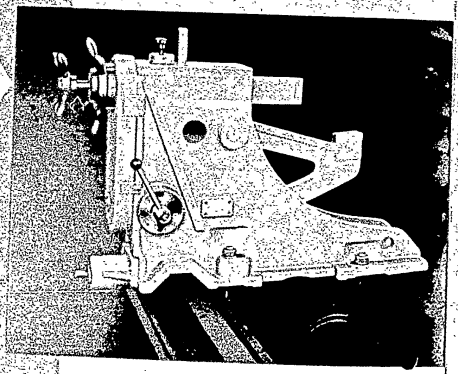


Worm Wheel with Needle Bearing of Chuck



The Rests

supplied with the machine are of two kinds: large rests for grinding [illegible] 195 to 285 mm [illegible] smaller ones [illegible] 190 mm [illegible] grinding [illegible] grinding [illegible] The [illegible] the [illegible] operator [illegible] the [illegible] The [illegible] kinds are supplied [illegible] the customer's wishes. The movement of the rests on the front bed is operated by hand by means of a ratchet lever.

Electrical Equipment

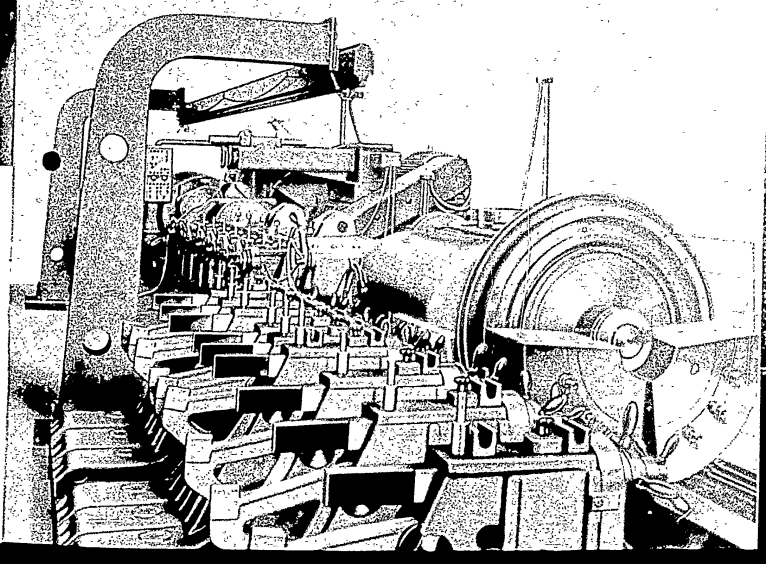
All the electric operations of the machine are remote controlled by means of push-buttons fitted on a control panel arranged on a swivel at the operator's post. The protective contactors, relays, fuses and other elements of the electrical equipment are arranged in two cabinets one of which is fixed and set up near the operator's post while the other, mounted on the wheelhead slide, carries the control panel and travels with the wheelhead along the shaft being ground. The machine is supplied normally equipped for current 3×380 volts, 50 c.s.

Standard Equipment

Grinding wheel clamping flange, wheel puller for grinding wheel flange, balancing arbour with nut, replacement belt pulley of wheelhead motor for worn grinding wheel, suspension of grinding wheel flange, wheel puller for wheelhead pulley, 2 centers, ratchet lever for hand feed of workheads, tailstock and rests, 7 large rests for main journals, 2 large rests for big end journals, 7 small rests for main journals, 2 small rests for big end journals, gauge for measuring during machining with a range of 130 to 285 mm (5 1/8" to 11 1/4"), gauge plates for levelling of beds, 32 weights, set of shims under machine for levelling of beds, complete cooling equipment, set of coolant splash guards, lighting of machine, set of spanners, operating instructions, precision test record.

Optional Equipment

Grinding wheel balancing stand, electrical equipment for other system of power than 380 Volts, 3-phase, 50 cycles.



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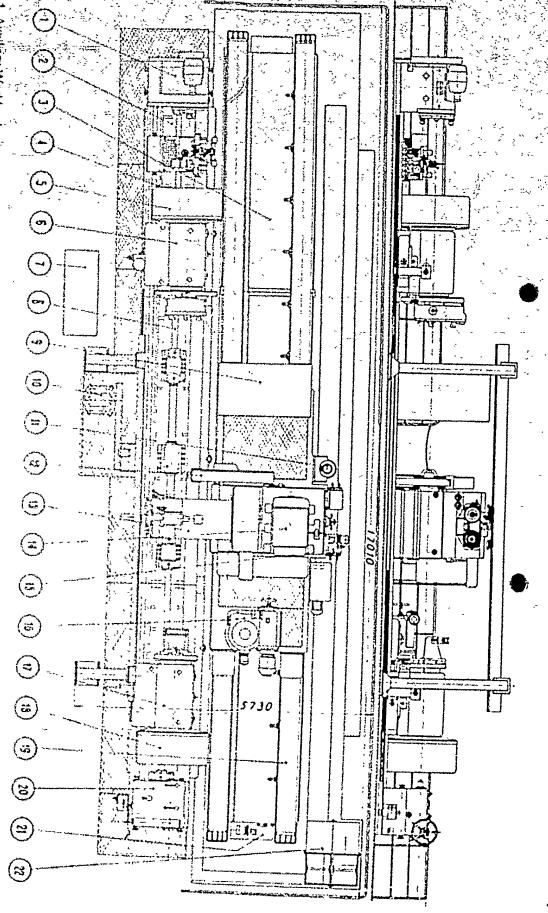

1. Auxiliary Workhead
2. Front Bed
3. Rear Bed
4. Front Bed Guide
5. Balancing Equipment of L. H. Main Workhead
6. L. H. Main Workhead
7. Electrical Equipment Cabinet I
8. Drive Shaft
9. Electrical Equipment Cabinet II
10. Motor of Main Work Spindle Drive
11. Coolant Pump
12. Grinding Wheel
13. Control Arm of Wheel Spindle Drive
14. Motor of Wheel Spindle Drive
15. Cross Guide of Wheel Spindle
16. Gear Box of Wheelhead Slide
17. R. H. Main Workhead
18. Balancing Equipment of R. H. Main Workhead
19. Workrests of Wheelhead Slide
20. Auxiliary Tailstock
21. Lubricating System of Rear Bed Guideways
22. Coolant Tank

Specification

Swing	mm	1300 / 51"
Maximum distance between chucks	mm	6000 / 19'8 1/4"
Minimum distance between chucks	mm	3000 / 9'10 1/8"
Maximum distance between centers	mm	6000 / 19'8 1/4"
Maximum eccentricity of big end journals	mm	250 / 9'13/16"
Minimum eccentricity of big end journals	mm	120 / 4 11/16"
Maximum diameter ground with 1600 mm(63") dia.grinding wheel	mm	600 / 23 1/2"
Minimum diameter ground with grinding wheel worn down to 1200 mm (47.1/4")	mm	30 / 1.3/16"
Grinding wheel (diameter × maximum width × bore)	mm	1600×140×1000 / 63"×5 1/2"×40"
Diameter of worn grinding wheel	mm	1200 / 47 1/4"
Diameter in large rest (max. — min.)	mm	280—195 / 11"—7 11/16"
Diameter in small rest (max. — min.)	mm	190—140 / 7 15/32"—5 1/2"
Maximum diameter of flange of crankshaft for chucking	mm	550 / 13 3/4"
Maximum diameter of centering collar on flange	mm	300 / 11 3/4"
Maximum diameter of crankshaft journal for chucking	mm	265.5 / 10 7/16"
Taper in spindle of auxiliary workhead		Metric 120
Taper in tailstock sleeve		Metric 160
Floor space of machine	mm	5730×17010 / 18'10" 55'10"
Weight of machine with standard equipment	kg	150000 / 330,7
Wheel spindle speeds	r. p. m.	
Speeds of main work spindles, infinitely variable	r. p. m.	
Speed of driver of auxiliary work spindle, infinitely variable	r. p. m.	
Maximum longitudinal movement of wheelhead slide	mm	8000
Maximum cross movement of wheelhead slide	mm	545
Hydraulic rapid traverse of wheelhead	mm	350
Stroke of damper of hydraulic traverse	mm	100
Speed of hydraulic traverse per minute, infinitely variable, with damper connected	mm	
Axial movement of grinding wheel	mm	5 to 200 / 3 16" to 7 7/8"
Speed of slide for grinding per minute, infinitely variable	mm	10 / 25.4"
Speed of slide for trueing per minute, infinitely variable	mm	195 to 1950 / 7 3 4" to 77"
Speed of power traverse of wheelhead, per minute	mm	19 to 195 / 3/4" to 7 3 4"
Power feed of wheelhead for infeed grinding, referred to diameter, per minute	mm	100 / 4"
Total output of motors	kW	0.025 to 3.0 / 0.001" to 0.12"
Maximum weight of workpiece	kg	64 / 64
Weight of machine	kg	3000 / 6610 lbs
		160.000 / 160 tons

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS.

The particulars in the prospectus are not binding in detail

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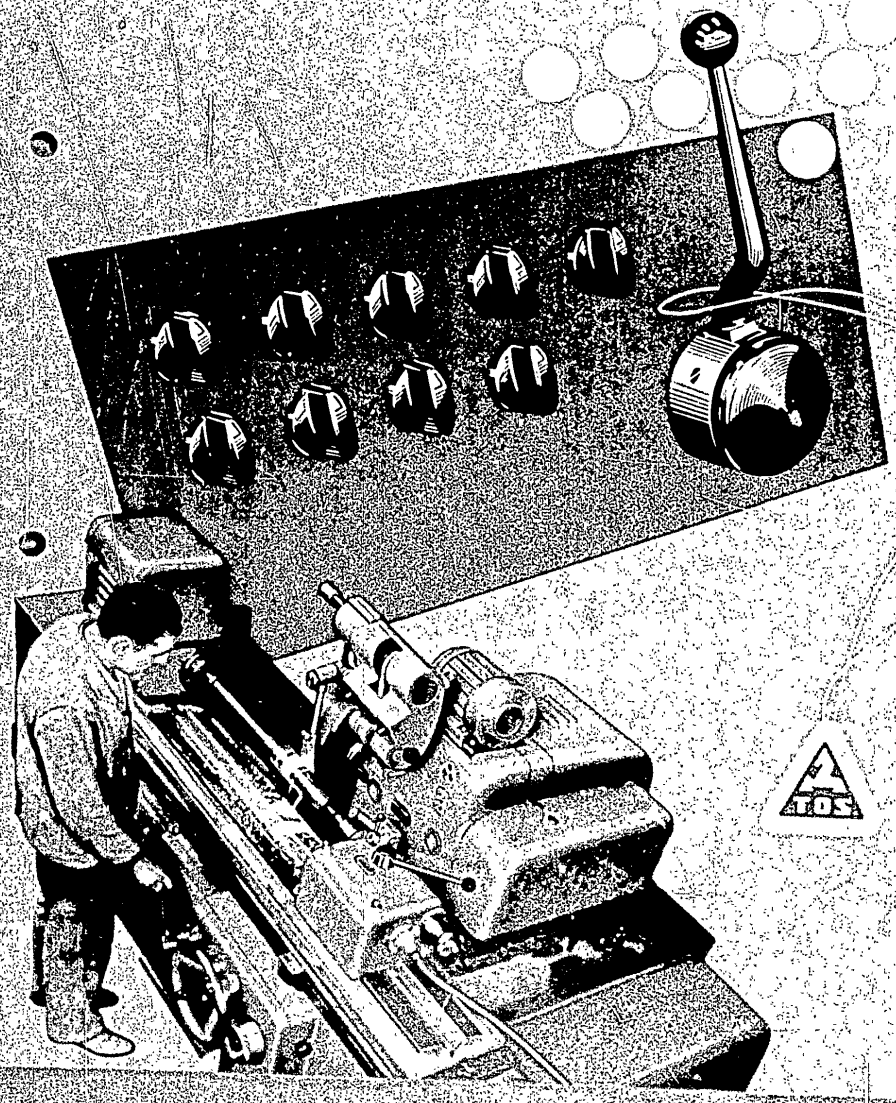
KAMENÍČEK

Model

RUA 3

Universal Grinding Machine



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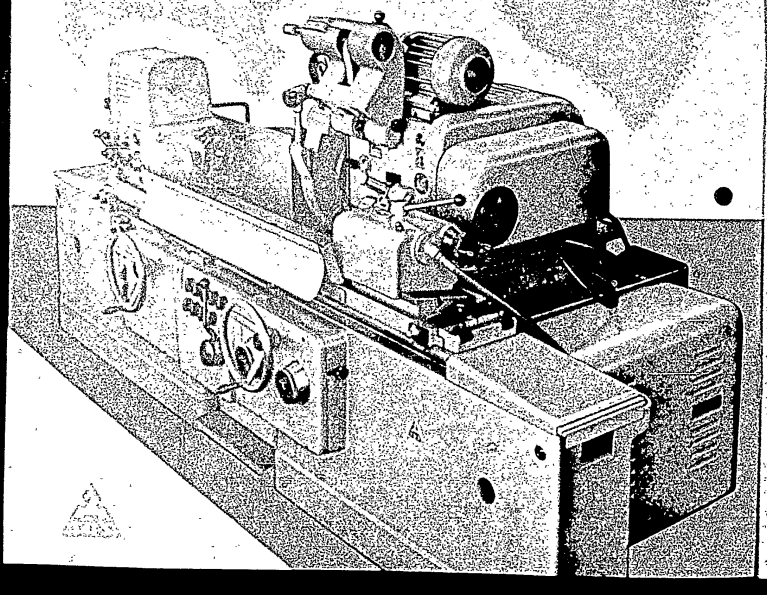
UNIVERSAL GRINDING MACHINE, MODEL BUA 31

This machine, designed and built for mass and single part production, is suitable for cylindrical grinding (with hydraulic table traverse as well as with the plunge-cut method), external or internal, and for face grinding. From the point of view of ingenious design and economical production the machine meets all demands by: Ease of Operation; High Output; High Degree of Accuracy and Surface Finish.

Outstanding features and advantages:

- Operation by a single lever reduces non-productive time and increases output.
- Automatic working cycle enables one or several machines to be attended by one operator.
- Infinitely variable speed of the hydraulic table traverse is the first condition for obtaining dimensional accuracy and a smooth surface finish.
- Infinitely variable cross feed of wheelhead in the plunge-cut method.
- Accurate and soft reversalas of table traverse increase the quality of surface finish and prolongs the life of machine.
- Quick hydraulic adjustment of wheelhead ensures exact control and reduces non-productive time.
- Fine elimination of wear of the grinding wheel while running is most essential for grinding to close tolerances.
- Swivel feature of wheelhead and possibility of mounting the grinding wheel on both ends of the spindle (on special order) enable the grinding of steep tapers on either side, and by using an angular grinding wheel also the face grinding on both sides, and cylindrical grinding.
- Hydraulically eliminated backlash of the feed screw increases sensibility of the cross feed.
- Visual check of the whole grinding operation.
- Footstock centre-sleeve controlled hydraulically by a footrediale or by hand.
- All rotating parts of motors are dynamically balanced, which eliminates vibration and thus greatly contributes to accurate and smooth surface finish.
- Hydraulic pump and a part of the hydraulic system mounted outside the machine eliminate vibration and the undesirable heating of the machine.
- High output power of motors permits the use of wide face grinding wheels, reduces the production time and increases the output with the plunge-cut method.



The Workhead

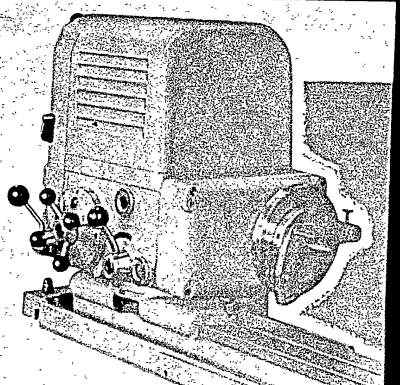
is arranged for grinding between dead centres or for chucking work and swivels up to 90 deg. The spindle is mounted in adjustable, automatically lubricated plain bearings.

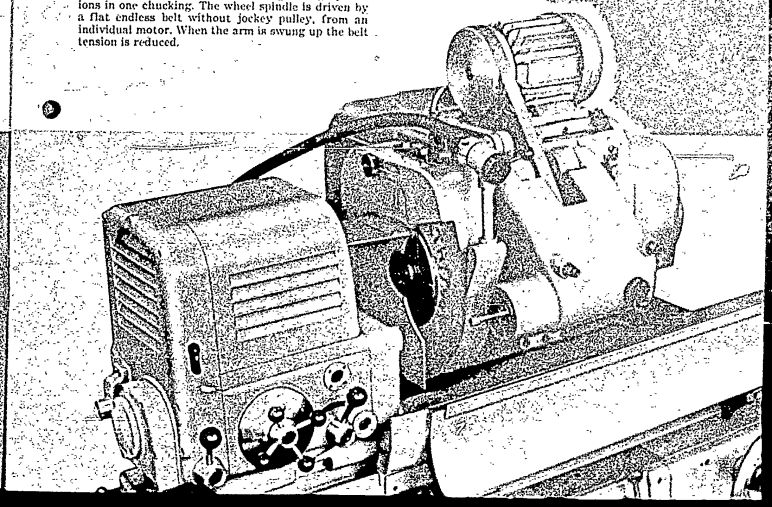
The Wheelhead

swivels up to 60 deg. in either direction. The hardened superfinished spindle rotates in adjustable plain bearings which are lubricated with filtered oil supplied by an individual oil pump. The power is transmitted by V-belts from an electric motor. By changing the spindle pulley two different spindle speeds are obtained, i. e. for a new and a worn grinding wheel. The cross feed is by hand or hydraulic by means of a hardened and ground lead-screw and nut with hydraulically eliminated backlash. Coarse feed is accomplished by a handwheel (1 revolution of handwheel = 2 mm of dia. ground), fine feed by a knob (1 revolution of knob = 0.01 mm of dia. ground) for slow infeed or for compensating wheel wear. The automatic feed into the cut can be either in every table reversal or in the right or left-hand reversal only. From the whole feed range of 0.75 mm a certain part of the wheel path prior to attacking the work can be covered by rapid traverse. When applying the plunge-grinding method the wheel can be fed into the cut independently of the table traverse and with an infinitely variable speed. The rapid motion of the wheel slide is effected hydraulically for approaching the grinding wheel to the work and for its withdrawal from the work.

The Internal Grinding Attachment

fixed to the wheelhead can be put into working position by swinging down the arm. This attachment enables both internal and external grinding operations in one chucking. The wheel spindle is driven by a flat endless belt without jockey pulley, from an individual motor. When the arm is swung up the belt tension is reduced.





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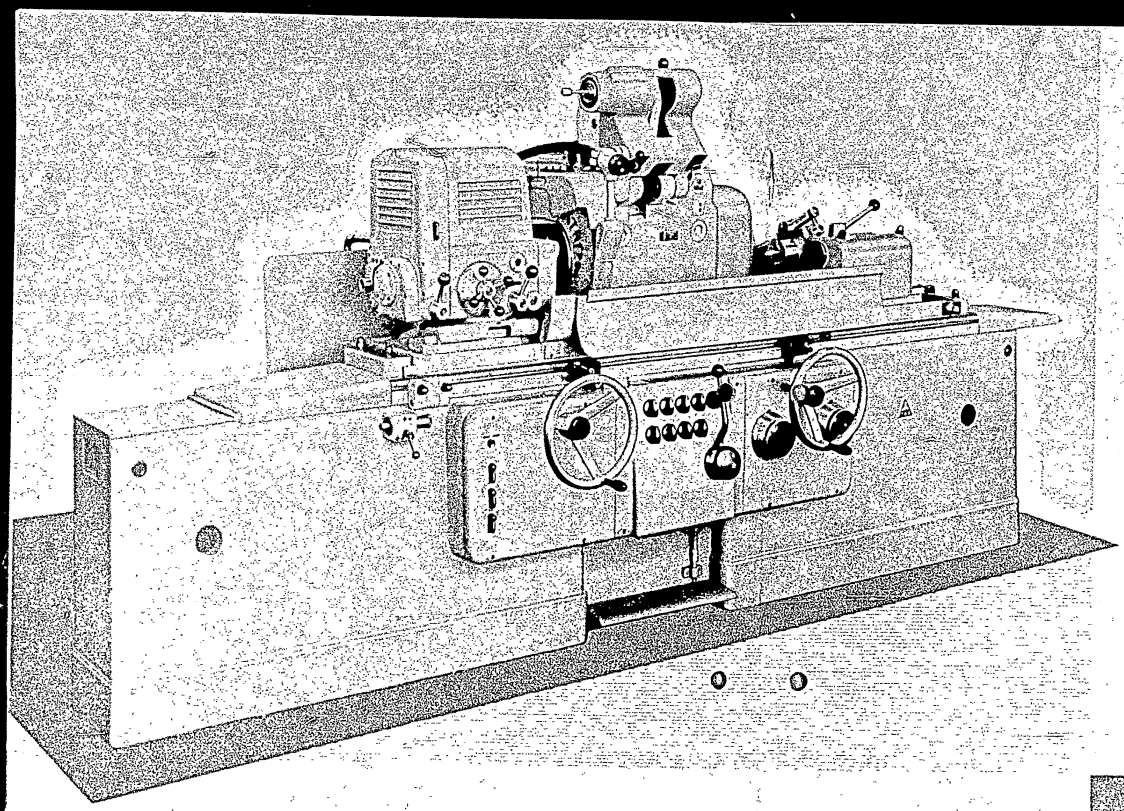
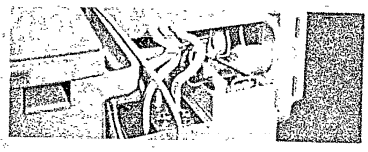


Hydraulic System and Cooling

The electric pump for the hydraulic system and the coolant pump are located separately outside the machine but are an integral part of it.



Lubrication

The wheelhead guides, all transmission gears and the cross feed screw are automatically lubricated by a certain amount of the waste oil from the hydraulic system. The working part of the wheelhead are lubricated with oil from individual oil pumps. The table slide-ways have automatic lubrication by an independent plunger pump supplying special oil, so that smooth [illegible] is ensured even at the lowest feed speed.

Electrical equipment

consists of statically and dynamically balanced [illegible] for the workhead and wheelhead for the [illegible] attachment and for the coolant pump [illegible] supplying the oil for the wheelspindle [illegible] hydraulic system. These motors are started by [illegible] tactors with remote pushbutton control

Table

The table is of the compound type, its upper part being adjusted on a scale for taper grinding. The table movement is limited by finely and coarsely adjustable stops.

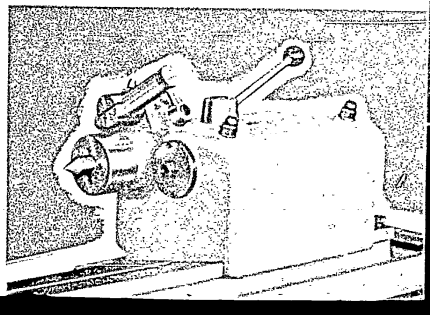
The table traverse is by hand or hydraulic, reciprocally locked. The speed is infinitely variable. Two adjustable speeds (for grinding and wheel truing) and rapid traverse for quick adjustment of table are available. The table stops in the [illegible] or both reversals within a range of 0—5 seconds. Reversing of table in the reversals is accurate, starting and stopping is very soft, the amount of cushioning being adjustable.

Bed

The bed is box-shaped, adequately ribbed and ingeniously designed to prevent any deflection even at maximum load.

Footstock

The hardened footstock centre sleeve is adjusted by a handwheel. It is controlled by a handlever or hydraulically by a foot-treadle. The hydraulic control can be employed only after the machine has been stopped to prevent loosening of the work during the operation. The centre pressure upon the workpiece is adjustable. On the footstock a micrometer diamond holder is mounted.



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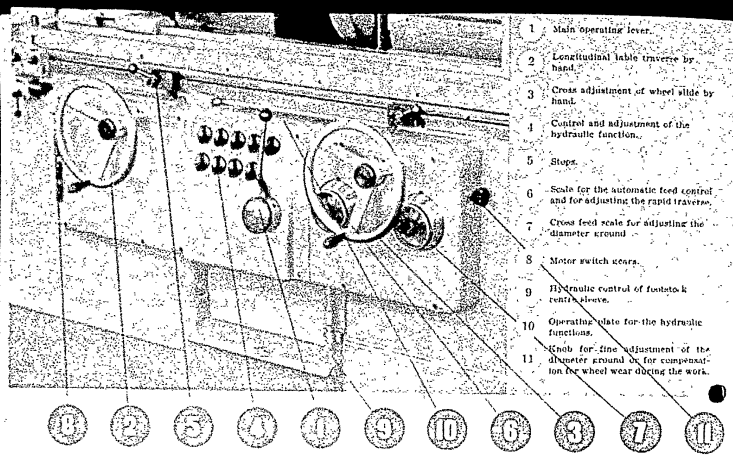


1 Main operating lever.
2 Longitudinal table traverse by hand.
3 Cross adjustment of wheel slide by hand.
4 Control and adjustment of the hydraulic function.
5 Stops.
6 Scale for the automatic feed control and for adjusting the rapid traverse.
7 Cross feed scale for adjusting the diameter ground on, for compensation for wheel wear during the work.
8 Motor switch gears.
9 Hydraulic control of footstock centre sleeve.
10 Operating plate for the hydraulic functions.
11 Knob for fine adjustment of the diameter ground on, for compensation for wheel wear during the work.

Operation of the Machine

[illegible] controlled by a single operating lever mounted on the control box. By engaging [illegible] hydraulic table traverse, rapid approach of wheelhead and cross [illegible] into action and the hydraulic footstock control is cut out. By disengaging the [illegible] supply and the hydraulic table traverse are stopped, the wheelhead is [illegible] mechanism returns to its initial position and the hydraulic footstock control [illegible] functions are adjusted according to job requirements by means of knobs which [illegible] on the up-rater and centralised of the control box.

By turning the knobs the following functions can be adjusted: speed of table traverse, table speed for wheel [illegible] dwell of table in the reversals, amount of cushioning the table motion in the reversals, time of sparking-out, rapid approach and withdrawal of the wheelhead, automatic infeed (in right, left or in both table reversals or for plunge-cut) and automatic stopping of the machine after reaching the worksizing dead stop.

All functions of the machine can be engaged or disengaged at will by shifting the main operating lever, so that for each job the most convenient working cycle may be set, or the individual functions may be controlled separately.

Automatic Working Cycle

The operator only clamps the work, puts the machine into action by the main operating lever, and after the operation is completed and the machine was automatically stopped he only removes the finished workpiece.

During the automatic working cycle the following functions may be controlled at will by shifting the main operating lever: the direction of table may be changed, the table traverse and the cross feed of the grinding wheel increased to the maximum, and the working cycle stopped.

Standard Equipment

3-jaw chuck with two sets of jaws — hydraulic footstock with micrometer trueing device without diamond — open rest (2 pieces for the length of 1000 mm, 3 pieces for the length of 1500 mm and 4 pieces for the length of 2000 mm) — wheel guard up to the width of 80 mm — additional change pulley for worm grinding wheel — grinding wheel dia. 500 × 80 mm, with balancing flange (for wheel from 50—80 mm in width) — wheel puller-balancing arbor

Internal grinding attachment consisting of the swing arm for internal grinding, 1 complete internal grinding spindle AP 15, swing-down trueing device attached to the table (without diamond), closed workrest (up to max. dia. 93 mm), micrometer stop for the hand table traverse

Coolant pump with tank and piping — pump of the hydraulic system with tank and piping

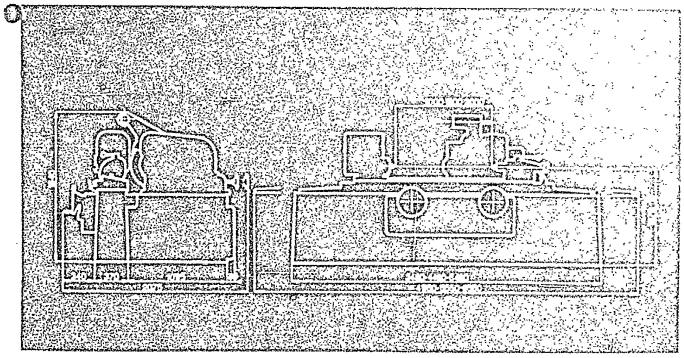
Electrical equipment: 6 electric motors to suit 3-phase current, 380 volts, 50 cycles, with protection contactors and remote pushbutton control.

2 centres — 1 set of belts — service spanners — set of drivers (20—80 mm) — safety guard foundation plates (10 pieces for the length of 1000 mm, 10 pieces for the length of 1500 mm and 12 pieces for the length of 2000) — oil can — operating instructions.

Optional Equipment

Internal grinding spindles (as per special list) — balancing flanges for wheels [illegible] 100—125 mm in width — wheel guards up to 125 mm in width — wheel balancing attachment on machine while running — open rests — radius trueing device without diamond — wheel [illegible] device without template and without diamond — angular wheel dresser without diamond — [illegible] ing stand — collet chuck attachment (ranging from 5—16 mm and stepped by 1 mm) [illegible] collet — additional collets of the same range — electromagnetic chuck dia. 200 mm with magnetising switch — rectifier for the electromagnetic chuck — spot light.

On special order the machine can be supplied with a dual-type wheelhead with [illegible] the grinding wheel either on the left or right-hand side of the wheel spindle.



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SPECIFICATIONS

		Metric			English		
GRINDING CAPACITY:							
Swing over table	mm		315			12 1/4"	
Distance between centres	mm	1000	1500	2000	39 1/4"	59"	78 3/4"
Workrest capacity	mm		50			3 1/2"	
GRINDING WHEEL:							
Diameter × width/bore	mm		500 × 80/203			19 3/4" × 3 1/4" × 8 1/4"	
Maximum diameter of grinding wheel	mm		500			19 3/4"	
Minimum diameter of worn grinding wheel	mm		350			13 3/4"	
WORKHEAD-FOOTSTOCK:							
Taper of work spindle	Morse		4			4	
Taper of footstock centre-sleeve	Morse		4			4	
Diameter of chuck	mm		190			7 1/2"	
Workhead swivels			90 deg			90 deg	
Spindle speed range (8 speeds)	R. p. M		19–480			19–480	
WHEELHEAD:							
Wheelhead swivels in either direction			60 deg			60 deg	
Cross travel	mm		170			6.7"	
Rapid traverse of wheel slide (hydraulic)	mm		50			1.97"	
Adjustment of wheelhead on wheel slide	mm		120			4.73"	
Total amount of automatic infeed	mm		1.5			0.059"	
Automatic infeed:							
either in left or right-hand or in both table reversals	mm		0–0.05			0–0.002"	
at plunge cut grinding	mm/min		0–5			0–0.62"	
Wheel speeds:							
Number			2			2	
New/worn wheel	R. p. M		1230/1470			1230/1470	
Wheelhead motor							
Speed	R. p. M		1420			1420	
Output	HP		10.2			10.2	
Oil pump motor							
Speed	R. p. M		1375			1375	
Output	HP		0.17			0.17	
TABLE:							
Swivels		6 deg	5 deg.	4.2 deg	6 deg	5 deg	4.2 deg
Tapers ground		1.5	1.6	1.6.5	1.5	1.6	1.6.5
Table traverse	mm	1250	1750	2250	49 1/4"	65"	88 1/2"
Minimum table motion	mm		1			0.01"	
Table speed infinitely variable	m/min.		0.05–6			2–236 per min	
INTERNAL GRINDING:							
Bore of internal spindle sleeve	mm		100			3.94"	
Maximum distance, sleeve to chuck	mm	1150	1650	2150	47"	65"	86"
Motor:							
Speed	R. p. M.		2800			2800	
Output	HP		1.9			1.9	
Hydraulic pump motor							
Speed	R. p. M		1420			1420	
Output	HP		2.7			2.7	
Coolant pump motor:							
Speed	R. p. M.		2775			2775	
Output	HP		0.25			0.25	
DIMENSIONS AND WEIGHTS.							
Floor space required (width × length)	mm	2075 × 4500,	5500,	6850	82" × 175"	230",	270"
Weight of machine with standard equipment	kg	4800	6100	6700	lbs 10600	13500	14800

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, the above specification and illustration is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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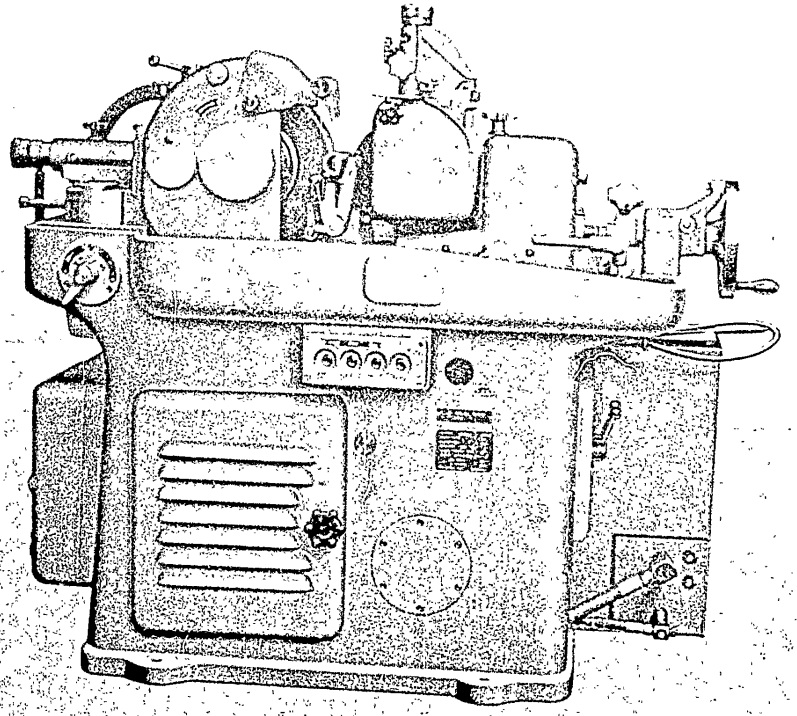

TYPE BBZ 60 CENTERLESS GRINDING MACHINE

BBZ 60

TOS

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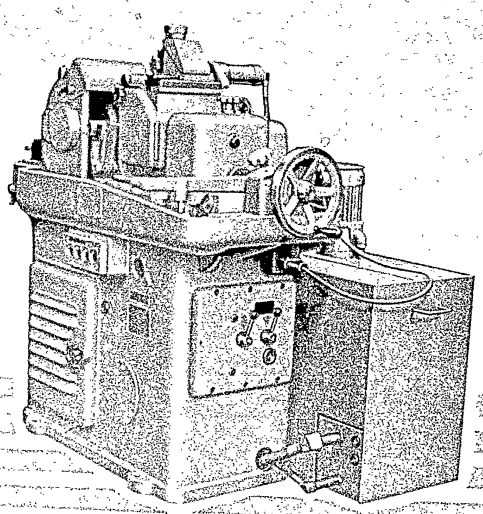


Centerless Grinding Machine

[illegible] grinding of cylindrical parts, straight as well as with shoulders, tapered parts as well [illegible] are machined by a method known as through feed grinding. parts of other shapes by [illegible] can be done on parts made of steel, hardened as well as unhardened, brass, copper, aluminum, fountain pens and common mild steel. It is, of course, necessary to select a suitable [illegible] is very simple and no specially skilled person is required to set it up. [illegible] machine is very versatile in its application and the great variety of grinding work which [illegible] one of the most useful machine tools.

Advantages of Centerless Grinding

- Parts clearly [illegible] precision
- High grade of surface finish.
- Output several times higher than that of center-type grinder
- Saving in time; subsidiary operations such as centering and chuckings are eliminated. cut is deeper.
- Deeper cut; [illegible] pressure does not cause inaccuracy of shape
- High degree of economy.
- Easy operation.

DESCRIPTION

The Wheel Head

The grinding wheel spindle runs in adjustable sleeve bearings and is driven by [illegible] V-belts. The thrust is taken up by a double thrust ball bearing. The [illegible] of a centrifugal rim.

The Work Head

The hardened and ground regulating wheel spindle runs in adjustable [illegible] through the gear box. Six speeds afford ample choice of a suitable speed. The [illegible] the wheel. The spindle is pressure lubricated by an own [illegible] pump.

The Base

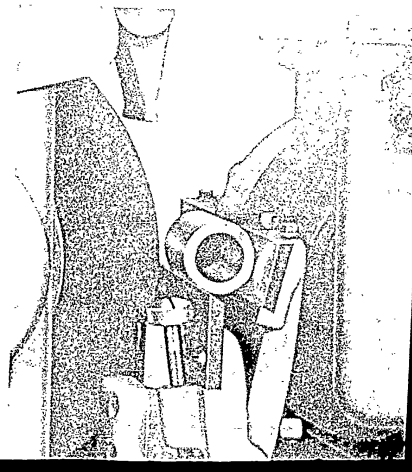
which is made of cast iron, is of sturdy design and contains the [illegible] pump, and also the built-in panel of the electrical equipment, [illegible] the main motor and the water pump motor.

The Work Rest

is fitted to the slide of the regulating wheel which is set at a distance corresponding to the diameter of the work piece.

The work-rest carries the work rest blade which guides the workpiece. The work rest blade is interchangeable for various diameters and shapes of workpieces. The machine is equipped for infeed grinding with a fixed gage carrier for the location of parts after grinding.

The regulating wheel is moved into and out of the cut by means of a hand lever.



Work rest

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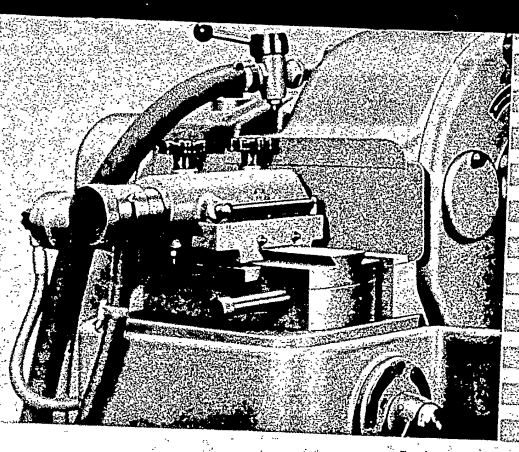
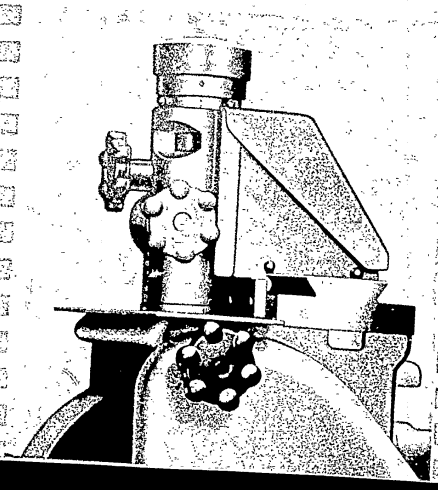
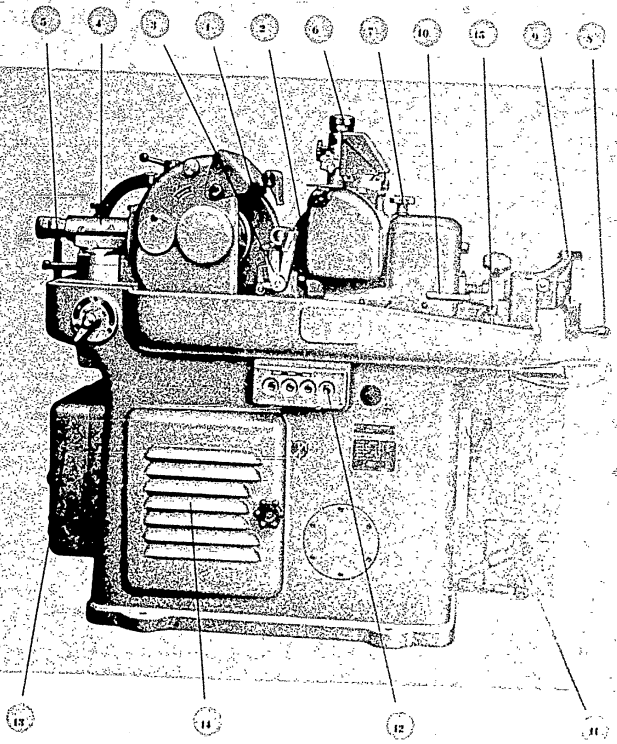


Trueing device of grinding wheel

The Wheel Trueing Device

Each wheel is equipped with its own wheel trueing device. The devices are mounted on swivels. The hydraulic feed is load controlled. For form grinding by the infeed method the wheel has to be given the negative shape of the part to be machined. For this purpose a special design of machine is available with a former plate. In case of the infeed grinding, care must be taken that the inclination of the regulating wheel trueing device is the same as that of the regulating wheel. If this requirement is fulfilled a hyperboloidal shape of the regulating wheel is formed and, as a result, a straight line contact with the workpiece.





Controls

1. Grinding wheel
2. Regulating wheel
3. Work-rest and work-rest blade
4. Grinding wheel trueing device
5. Fine setting of trueing device
6. Regulating wheel trueing device
7. Regulating wheel inclination adjusting screw
8. Hand wheel for feed of regulating wheel
9. Adjustable stop indicator of hand wheel (8)
10. Hand lever for infeed grinding
11. Gear box of regulating wheel
12. Push buttons of electric control
13. Main fuses, contactors
14. Pump of hydraulic system
15. Adjusting valve of hydraulic system for infeed grinding

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Centerless Grinding

is based on the following principles. When a cylindrical body is guided, between two rollers with parallel centre-lines, rotating in the same direction, in such a manner that its own centre-line is also parallel, it receives a rotary movement around its own centre line without moving forward. (Fig. 1)

If, however, the wheel marked P is deflected from its vertical position and rotates, the part being ground moves forward between the two wheels. The wheel which remains in its vertical position is the grinding wheel and does the grinding proper while, wheel P is the regulating wheel which causes the part being ground to move forward (Fig. 2).

If the surface of regulating wheel g remained cylindrical a single-point contact with the workpiece would result. In order to obtain a straight line contact the surface of the regulating wheel has to be modified. This is done by the wheel trueing device which has to be given the same inclination as the regulating wheel (Fig. 3). This gives the surface of the regulating wheel the shape of a hyperboloid with a straight-line contact with the work piece. It is therefore always necessary to true the surface of the regulating wheel to correspond to the given rate of feed. The regulating wheel is inclined from its vertical position for through-feed grinding, the angle of inclination depending on the required rate of feed of the workpiece (Fig. 3). For infeed grinding the regulating wheel remains perpendicular to the set at an angle of ½° in order to press the workpiece against the stop.

Fig. 1

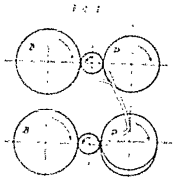


Fig. 2

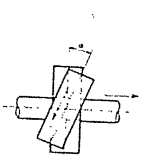
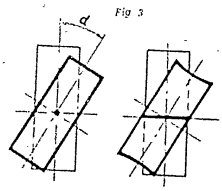
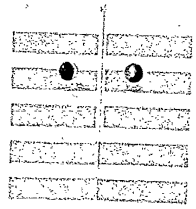
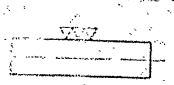


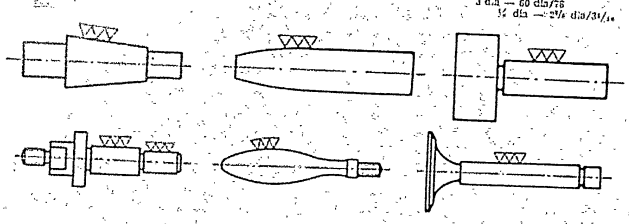
Fig. 3





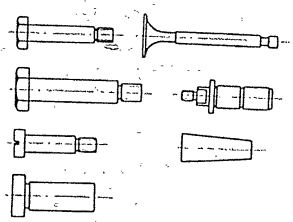
[illegible] examples of centerless grinding are shown, through-feed as well as infeed grinding with [illegible] diameters and lengths which can be machined on the type BBZ 60 centerless grinder.

Pa[illegible]	Equipment used	Length/Diameter mm inches
	standard	3 dia — 60 dia/220 ⅛ dia — ¼ dia/8⅝
	special	1.5 dia — 3 dia/220 1/16 dia — ⅛ dia/8⅝
	special	3 dia — 10.5 dia/3000 ⅛ dia — 15/16 dia/118
	special	6 dia — 25 dia/3000 ¼ dia — 1 dia/118
[illegible] Grinding		3 dia — 60 dia/76 ⅛ dia — 2⅜ dia/3 1/16

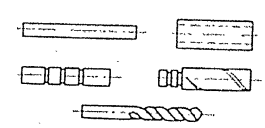


The economy of the type BBZ 60 centerless grinder in single-piece as well as in repetition work and its high output are obvious from the table below where examples of through-feed grinding as well as of infeed grinding are quoted with the approximate numbers of parts machined per minute.

Infeed Grinding:



Through feed Grinding:



Shanks of Bolts

Diameter mm	inches	Pieces per min approx
3 to 8	¼ to 9/16	8
10 to 12	⅜ to ½	5
14 to 20	9/16 to ¾	4
24 to 26	1 to 1⅜	3
39 to 45	1½ to 1¾	2

Pins 100 mm [illegible]

Diameter mm	inches	[illegible]
3 to 6	[illegible]	20
6 to 8	[illegible]	[illegible]
8 to 12	[illegible]	[illegible]
12 to 15	[illegible]	[illegible]
15 to 20	[illegible]	
20 to 25	[illegible]	
35 to 45	[illegible]	

Twist Drills

Diameter mm	[illegible]
3	[illegible]
5	[illegible]
8	[illegible]
10	[illegible]
15	[illegible]

Standard Equipment

1 Grinding wheel	300x80x140 mm	[illegible]
1 Regulating wheel	200x70x 75 mm	[illegible]
2 Trueing devices without diamond		
2 Work-rest blades for through-feed grinding, for diameters	3 to 12 mm 12 to 60 mm	[illegible]
2 Work-rest blades for infeed-grinding, for diameters	3 to 12 mm 12 to 60 mm	
1 Centrifugal coolant pump		
1 Coolant tank		
1 Electric motor	7.5 kW — 220/380 Volt	[illegible]
V-belts		1-13 x [illegible] 1265 mm
V-belts		2-10 x [illegible] mm
V-belts		2-10 x [illegible] 1320 mm
Set of spanners		1
Roller chain CSN (Czechoslovak Standard)		[illegible] — 133 links
Balancing arbor		1
Operating instructions		

Optional equipment

1 Work-rest blade for diameters	1.5 to 3 mm	[illegible]
Work-rest blades for special shapes	on request	
Former plates	on request	
Bar-rests for grinding long bars:	3 mm dia — 103/3000 mm	¼" dia — 1½"/118"
	6 mm dia — 25/3000 mm	¼" dia — 1"/118"
	6 mm dia — 25/1200 mm	¼" dia — 1"/118"

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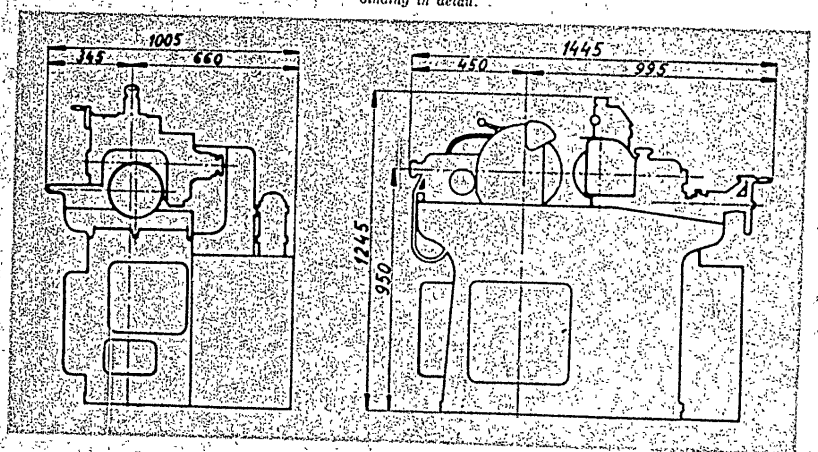
SPECIFICATION

Through-feed Grinding:			
Workpieces ground with standard equipment			
diameter	mm	3 to 60	[illegible]
maximum length	mm	220	[illegible]
Workpieces ground with optional equipment,			
diameter	mm	1.5 to 3	[illegible]
maximum length	mm	220	[illegible]
Infeed-Grinding:			
diameter of part	mm	3 to 60	[illegible]
maximum length	mm	75	3"
Dimensions of grinding wheel			
maximum diameter	mm	300	[illegible]
maximum width	mm	80	[illegible]
Dimensions of regulating wheel:			
maximum diameter	mm	200	[illegible]
maximum width	mm	80	[illegible]
Number of regulating wheel speeds		6	
Speed range of regulating wheel	r. p. m.	19 to 340	
Grinding wheel speed	r. p. m.	1900	
Motor of grinding and regulating wheels			
speed	r. p. m.	1440	
output	HP	10.2	
Floor space required	mm	1005x1445	[illegible] x 57"
Weight of machine:			
net with standard equipment	kg	1100	2430 lbs
shipping weight, ordinary packing	kg	1250	2760 lbs
shipping weight, seaworthy packing	kg	1350	3000 lbs
Volume of packing case	cu. metres	4,4	156 cu ft.
Measurements of packing case	mm	1500x1800x1600	59"x 71"x 63"

PLEASE SPECIFY IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS

The machines are continuously being improved upon. The particulars given in this prospectus are therefore not binding in detail.



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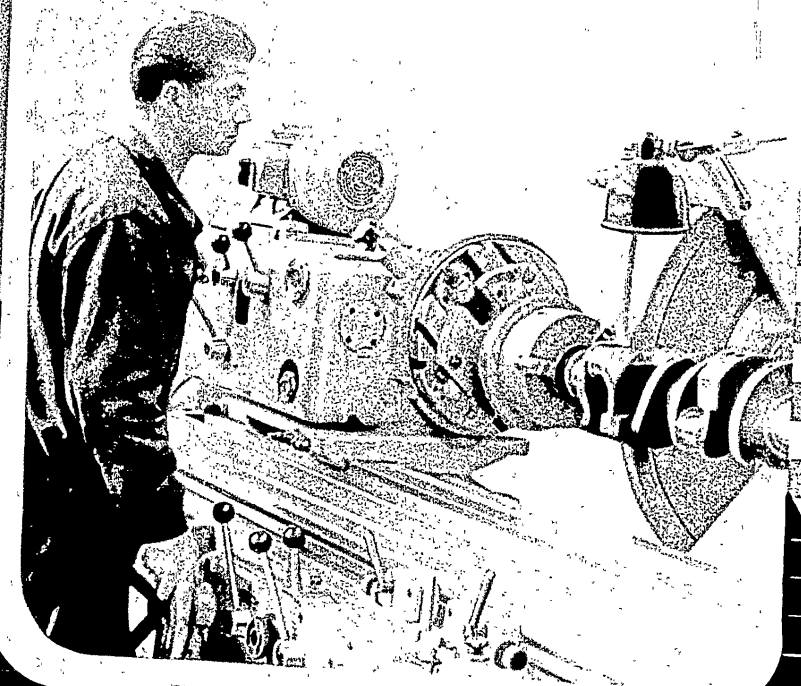

CRANKSHAFT GRINDER 4C

4C

TOS

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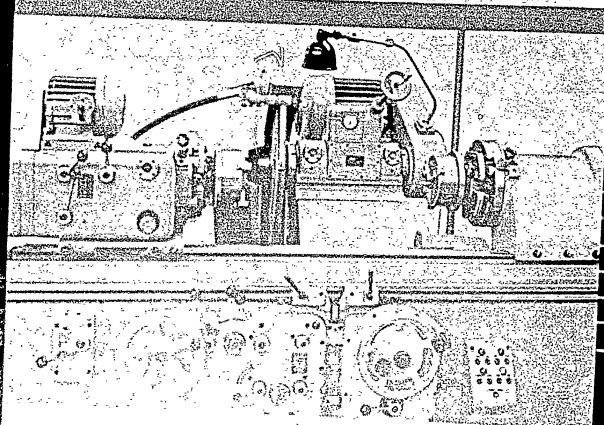

CRANKSHAFT GRINDER 4C

[illegible] duty machine is built for production grinding [illegible] main line bearings and crankpins, and also [illegible] all the requirements of garages and repair shops for re-grinding the pins and journals of motor car crankshafts.

The hydraulically operated table traverse and the automatic cross feed of the wheel head permit the machine to be used for plain grinding operations.

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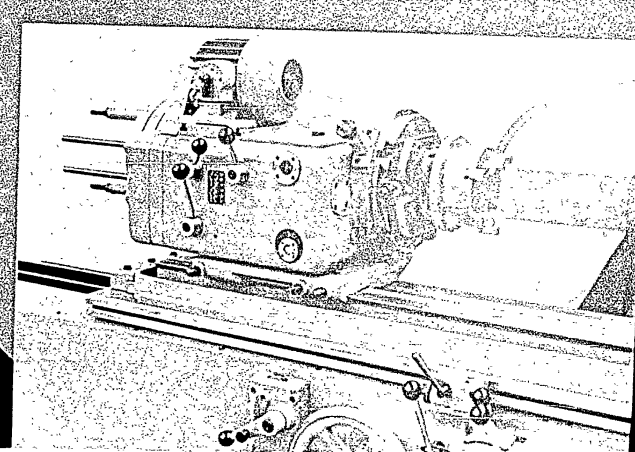
DESCRIPTION

The work head swivels 90° and is arranged for grinding between dead centres and for chucking work. The spindle, which runs in adjustable precision roller bearings, is fitted with a catch plate provided with guideways for adjusting the chuck to the required eccentricity. The catch plate has notches on its circumference for securing the crankshaft in position when balancing the crankpins. The plate under the chuck is provided with notches for accurate and quick adjustment of the crankshaft and swivels 90° and 180° or, if necessary 120° when grinding crankpins. The rear end of the spindle carries adjustable counterweights. The work head is adjusted on the table by means of a rack and pinion.



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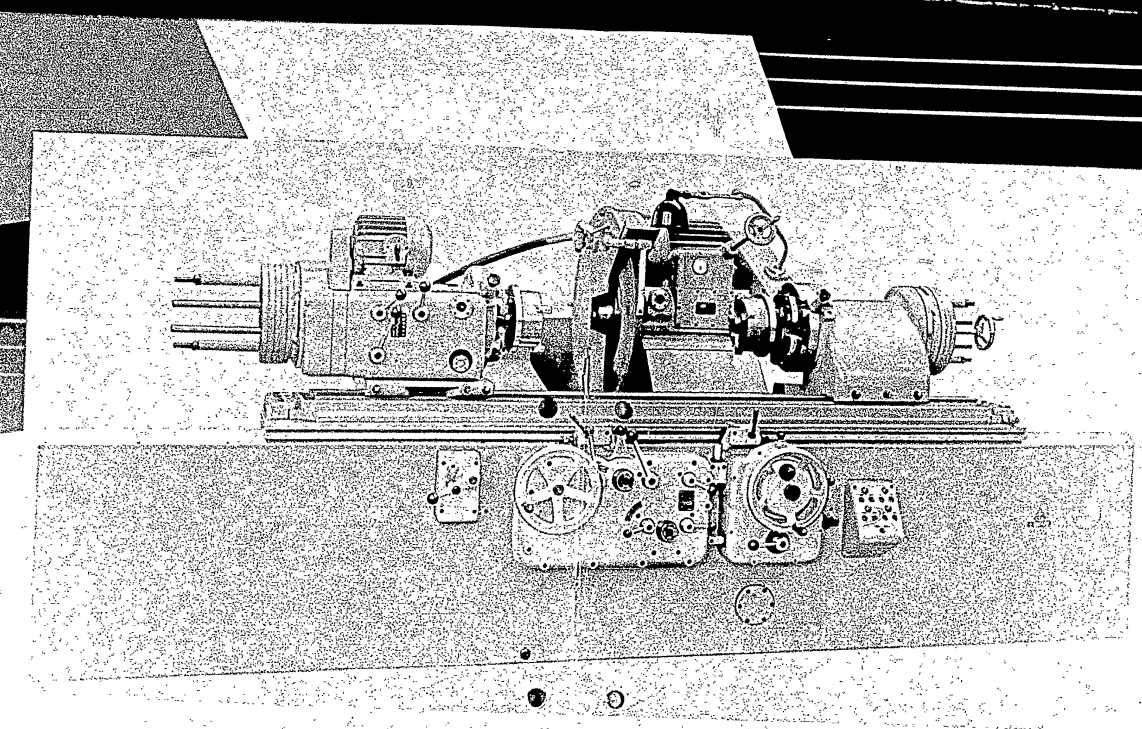
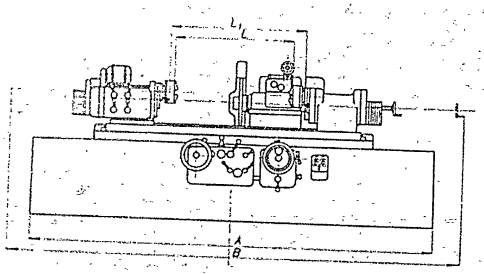
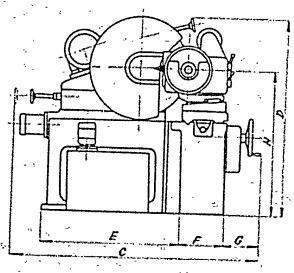
4C







L	L_1	A	B
1600 63"	1800 70⅝"	4720 185⅞"	6160 242½"

C	D	E	F	G	H
2500 98⅜"	1580 62⅜"	1090 42⅞"	335 13⅛"	335 13⅛"	1148 45⅛"

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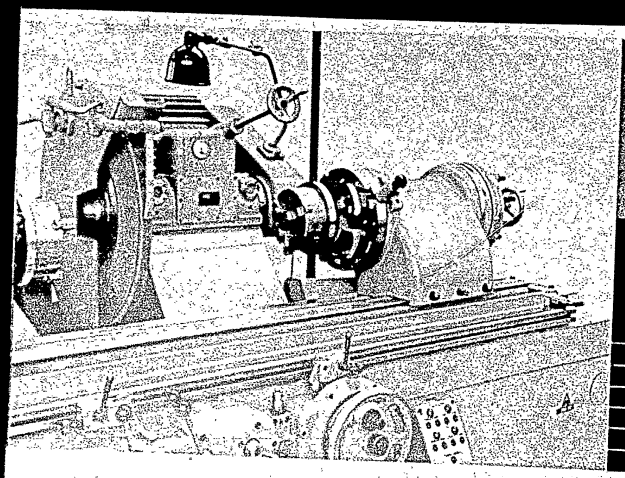

[illegible] a slide travelling in the cross guides of the bed. The grinding wheel is fed [illegible] feed or hydraulically at every table reversal, or at the right or left- [illegible] wheel is fed into the cut independently of the table motion, [illegible] effect hydraulically. The wheel head spindle is mounted in [illegible] by V-belts from an individual motor. The spindle is finely adjustable in [illegible] on a built-in dial indicator.

[illegible] being adjustable on a scale for taper grinding. The table [illegible] hydraulically and is limited by coarsely and finely adjustable [illegible] adjusted up to 5 seconds.

[illegible] the clamping and balancing attachments are of the same design as those [illegible] is adjusted by a hand wheel. The centre is held against the work [illegible] is adjusted on the table by a rack and pinion.

The bed of [illegible] is heavily ribbed to prevent any vibration. The table guideways are [illegible] lubricated.

Cooling. The coolant is supplied by an electric pump from a tank located outside the machine.

The electrical equipment consists of electric motors for the work-head and wheel head and motors for the [illegible] of the hydraulic and cooling systems. The motors have protective contactors with remote push button control.

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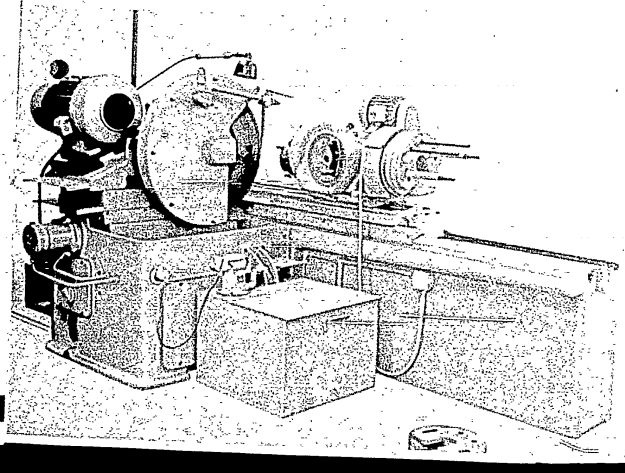
Standard equipment: Workhead for grinding between dead centres or in a chuck, two-speed hand traverse of table and wheel slide, axial feed of grinding wheel ± 8 mm for precision grinding of fillets by hand (with indicator), hydraulic table traverse, hydraulic feed of wheelhead and hydraulic rapid traverse of wheel slide, 4 electric motors for 3×380 volts, 50 cycles, including electrical equipment, 2 three-jaw chucks dia. approx. 200 mm, grinding wheel dia. 760×32 mm with balancing flange, balancing arbor, wheel pulley, change pulley for worn grinding wheel, wheel guard, 2 steady rests, locating attachment for adjusting the crank pins, coolant pump with piping and tank, splash guards, 14 counterweights, wheel truing device to be mounted on the steady rest (without diamond), wheel dresser to be mounted on the steady rest (without diamond), measuring plate on the table, positive stop of longitudinal table feed, [illegible] levelling plate, set of wedges for levelling the bed, set of bolts, set of spanners, operator's instruction booklet.

Optional equipment: Steady work-holders instead of adjustable chucks for clamping crankshafts [illegible] according to drawings of crankshafts and suitable for mass production only), [illegible] adjusting the crankpins in plunge-cut grinding (without template) wheel truing device [illegible] on the table (without diamond), wheel dresser to be mounted on the table [illegible] steady rest, narrow steady rest (18 mm), additional balancing flange [illegible] measuring crankpins, electric motors for current characteristics other than [illegible] wheel balancing stand, spot light



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SPECIFICATIONS:

		Metric	English
Swing	mm	500	19.70"
Distance between chucks	mm	1600	63"
Distance between centres	mm	1800	71"
Max. eccentricity of pin	mm	120	4.73"
Max. dia. ground in work rest	mm	130	5.12"
Standard grinding wheel: max. dia	mm	760	29.90"
min./max. width	mm	18/50	0.7"/2"
R.p.m. of grinding wheel		800, 905	800, 905
Taper of work spindle	Morse	5	5
Taper of tailstock centre sleeve	Morse	5	5
Work head swivels		90°	90°
Table swivels		5°	5°
Maximum taper ground		1 : 6	1 : 6
Maximum longitudinal table motion	mm	2150	84.50"
Minimum longitudinal table motion	mm	1	0.04"
Speed of table infinitely variable	m/min.	0.1—6	4—20 feet per min.
Wheel head: cross motion	mm	160	6.30"
rapid hydraulic motion	mm	90	3.54"
adjustment on wheel slide	mm	250	9.80"
automatic feed at table reversals (referring to the diameter ground)	mm	0.005—0.05	0.0002"—0.002"
automatic feed in plunge-cut grinding (referring to the diameter ground)	mm/min.	0.05—4	0.002—0.15 in. per min.
Axial motion of grinding wheel in either direction	mm	±8	±0.30"
Range of work spindle speeds	r.p.m.	20—200	20—200
Number of work spindle speeds		6	6
Motors: Work head motor: Speed	r.p.m.	1400	1400
Output	kW	0.8	0.8
Wheel head motor: Speed	r.p.m.	940	940
Output	kW	5	5
Hydraulic pump motor: Speed	r.p.m.	1400	1400
Output	kW	1.85	1.85
Coolant pump motor: Speed	r.p.m.	2800	2800
Output	kW	0.25	0.25
Floor space required	mm	2500×6100	98"×240"
Weight of machine: with standard equipment	kg	7200	15,880 lbs
packed for rail	kg	7720	17,100 lbs
packed for ocean shipment	kg	8500	18,800 lbs
Dimensions of case	m	5.2×2.1×2	205"×83"×80"

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

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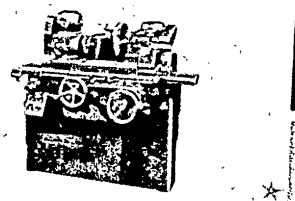

UNIVERSAL-SCHLEIFMASCHINE Modell 1U

Leistungsfähige Präzisionsmaschine zum Aussenrund-, Innenrund-, Kegel- und Stirnschleifen
Hydraulischer Tischvorschub
Hydraulische Schleifscheibenbeistellung
Schwenkbarer Schleifspindelstock
Werkstückspindelstock mit 6 Spindelgeschwindigkeiten, zum Kegel- und Stirnschleifen um 90° schwenkbar

NORMALZUBEHÖR:

Schwenkbarer Universal-Werkstückspindelstock zum Schleifen zwischen toten Spitzen oder im Spannfutter, Dreibackenfutter ø 115 mm mit 2 Satz Spannbacken, Reitstock mit hydraulisch betätigter Pinole und Diamanthalter (ohne Diamant), 2 Körnerspitzen, Schleifscheibe ø 300×25 mm mit Auswuchtflansch, Flanschabrückvorrichtung, Auswuchtdorn, Schleifscheibenschutzhaube, offener Setzstock, schwenkbare Innenschleifeinrichtung für Spindeln ø 70 mm mit einer Spindel A 20 mit Zubehör, geschlossener Setzstock (grösster Materialdurchlass 70 mm), schwenkbarer mikrometrischer Diamanthalter zum Befestigen auf den Tisch (ohne Diamant), mikrometrischer Anschlag für handbetätigten Tischvorschub, 1 Satz Mitnehmer, Kühlmittelpumpe mit Behälter und Rohrleitung, 1 Satz Schutzbleche gegen Zerspritzen der Kühlflüssigkeit, elektr. Ausrüstung mit 4 Elektromotoren für Dreiphasenstrom 380/220 V, 50 Per. mit ferngesteuerten, mittels Druckknöpfe betätigten Schützen, 1 Satz Riemen, 1 Satz Schlüssel, Bedienungsanleitung.

SONDERZUBEHÖR:

Radiusabdrehvorrichtung (ohne Diamant), Formabdrehvorrichtung (ohne Schablone und Diamant), Vorrichtung zum Schleifen von stumpfen Kegeln in toten Spitzen (Kegel bis 120°, ø 150 mm, Länge 140 mm), Schleifscheibenauswuchtflansch, Auswuchtständer, Spannzangeneinrichtung (Bereich 5—13 mm, abgestuft je 0,5 mm) einschl. 1 Spannzange, Spannzangeneinrichtung (Bereich 5—13 mm, abgestuft je 0,5 mm einschl. 1 Spannzange, Spannzangenspindeln, elektromagnetische Spannplatte ø 150 mm mit Demagnetisator, Gleichrichter zum Speisen der elektromagnetischen Spannplatte, Arbeitsleuchte, Elektromotoren und elektrische Ausrüstung für andere Stromspannung als 380 V, 50 Per. auf Antrage.

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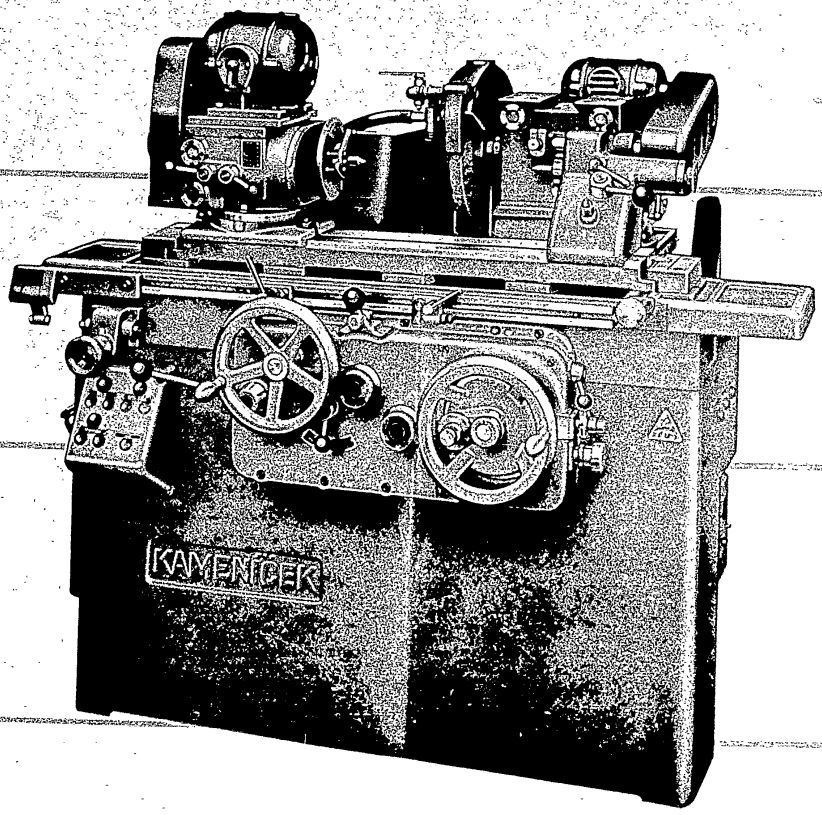
UNIVERSAL-SCHLEIFMASCHINE MODELL 1U



TOS

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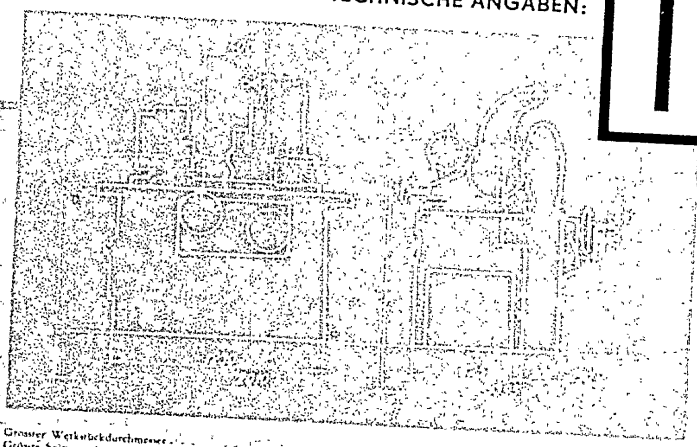
HAUPTABMESSUNGEN UND TECHNISCHE ANGABEN:



Grösster Werkstückdurchmesser	mm	200
Grösste Spitzenweite	mm	630
Grösster Durchgang im Setztock	mm	70
Grösste Entfernung vom Innenschleifspindelhalter zum Spannfutter	mm	310
SCHLEIFSCHEIBE:		
Aussendurchmesser×Breite×Lochdurchmesser		600×63×305
Grösste Schleifscheibenbreite	mm	32
WERKSTÜCKSPINDELSTOCK-REITSTOCK:		
Kegel in der Werkstückspindel		3
Kegel in der Reitstockpinele	Morse	3
Werkstückspindelstock schwenkbar vorwärts/rückwärts	Morse	90°/90°
Werkstück-Drehzahlen		6
Werkstück-Geschwindigkeitsbereich		35—64—95—155—255—365
Werkstück-Antriebsmotor: Drehzahl	U/min.	1390
Leistung	U/min.	0,5
	PS	
SCHLEIFSPINDELSTOCK:		
Beiderseits schwenkbar um		90°
Querverstellung des Schleifschlittens		130
Verstellbarkeit des Schleifspindelstockes am Schleifschlitten	mm	220
Selbsttätige Beistellbewegung des Schleifschlittens am rechten Tischhubende reduziert	mm	0,005—0,05
den Schleifdurchmesser um		
Drehzahl der Schleifscheibe neuer abgenutzter	mm	1950—2600
Schleifspindel-Antriebsmotor: Drehzahl	U/min.	2850
Leistung	U/min.	3
	PS	
TISCH:		2
Beiderseits schwenkbar um		1,4
Erreichbare Konizität		500
Grösste Längsbewegung des Tisches		0,05—2
Kleinste Längsbewegung des Tisches (hydr.)	mm	1350
Tischgeschwindigkeit (hydraulisch stufenlos regelbar	mm	12
Elektromotor für hydraulischen Antrieb und Kühlung: Drehzal	m min.	
Leistung	U min.	
	PS	
INNENSCHLEIFEINRICHTUNG:		10
Bohrung der Innenschleifspindelhülse		2850
Elektromotor: Drehzahl	⌀ mm	3,4
Leistung	U min.	
Flächenbedarf der Maschine	PS	
Gewicht der Maschine mit Normalzubehör	mm	1395×2010
mit bahnmässiger Verpackung	kg	1450
mit seemässiger Verpackung	kg	1520
Kistenmasse einzeln (seemässige Verpackung) Länge×Breite×Höhe	kg	1560
	cm	160×146×160

BEI BESTELLUNG BITTEN WIR, DIE BETRIEBSSPANNUNG FÜR DIE ELEKTROMOTOREN ANZUGEBEN!

Diese Angaben entsprechen der Maschinenkonstruktion zur Zeit der Drucklegung dieses Prospektes. Durch den jeweiligen Entwicklungsstand bedingte Konstruktionsänderungen bleiben vorbehalten

KOVO PRAHA · TSCHECHOSLOWAKEI

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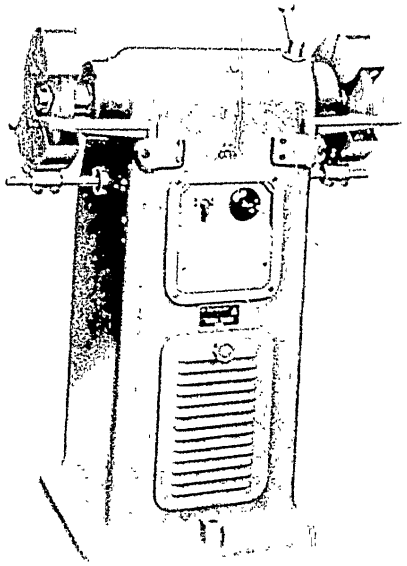
TOOL GRINDING MACHINES

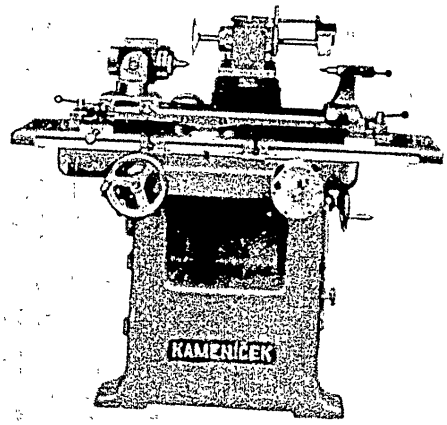
TWO-WHEEL GRINDERS
Types BL 3 and BL 4



These machines are intended for grinding the burrs of castings and forgings welds and for sharpening cutters, chisels etc. With the use of suitable buffs they may also serve as buffing machines.

Type		BL 3	BL 4
Grinding wheel diameter ..	mm	225	350
Spindle speed for grinding .	r.p.m	2800	2710
Spindle speed for buffing ...	r p.m	4100	4370
Power of electric motor	HP	3	4.5
Floor space required by machine ..	mm	550 x 950	700 x 1350
Weight of machine ..	kg	360	500

UNIVERSAL TOOL GRINDER Type BN 102 (K102)



This machine is intended for sharpening various cutting tools such as cylindrical and tapered reamers, end and side milling cutters with straight or helical cutting edges, recessed milling cutters, end milling cutters, taps, countersinks, saws, lathe tools, etc. As optional equipment are available cylindrical, surface and internal grinding attachments, an attachment for sharpening twist drills, an attachment for sharpening cemented carbide tipped tools as well as various other attachments and equipments which increase the versatility of the machine so that it satisfies the demands of modern tool shops

Type		BN 102
Grinding diameter ..	mm	280
Distance between headstock and tailstock centres ...	mm	561
Surface of table ..	mm	920 x 140
Wheel spindle speed	r p m	2850, 5600
Power of motor ..	HP	1 1 6
Floor space required by machine	mm	1435 x 1860
Weight of machine	kg	1000

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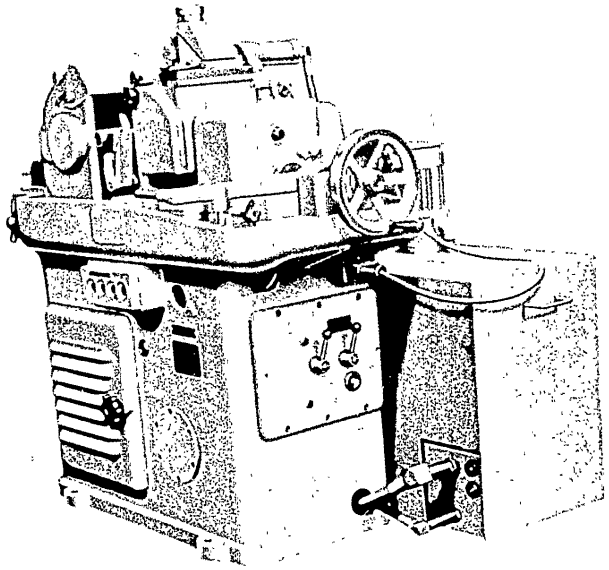
CENTRELESS GRINDING MACHINES

Type BBZ 60

A machine for precision grinding of external cylindrical and tapered surfaces on plain, shouldered and other shaped rotating objects. Suitable for grinding hardened as well as unhardened steel, copper or aluminium alloys, plastics, glass and other materials. The following optional equipment is available for the machine: workrest blades for grinding parts with a small diameter, workrests blades for special shapes, supports for grinding long bars, an automatic hydraulic magazine feed attachment.



Type		BBZ 60
Through-feed grinding:		
With standard equipment workpieces of the following dimensions can be ground: diameter	mm	3 to 60
maximum length	mm	220
With optional equipment workpieces of the following dimentions can be ground diameter	mm	1.5 to 3
maximum length	mm	220
	mm	75
Maximum length for infeed grinding		
Speed of grinding wheel	r p m	1900
Number of regulating wheel speeds		6
Range of regulating wheel speeds	r p m	19 to 340
Power of motor	HP	10
Floor space required	mm	1005 x 1445
Weight of machine with standard equipment	kg	1100

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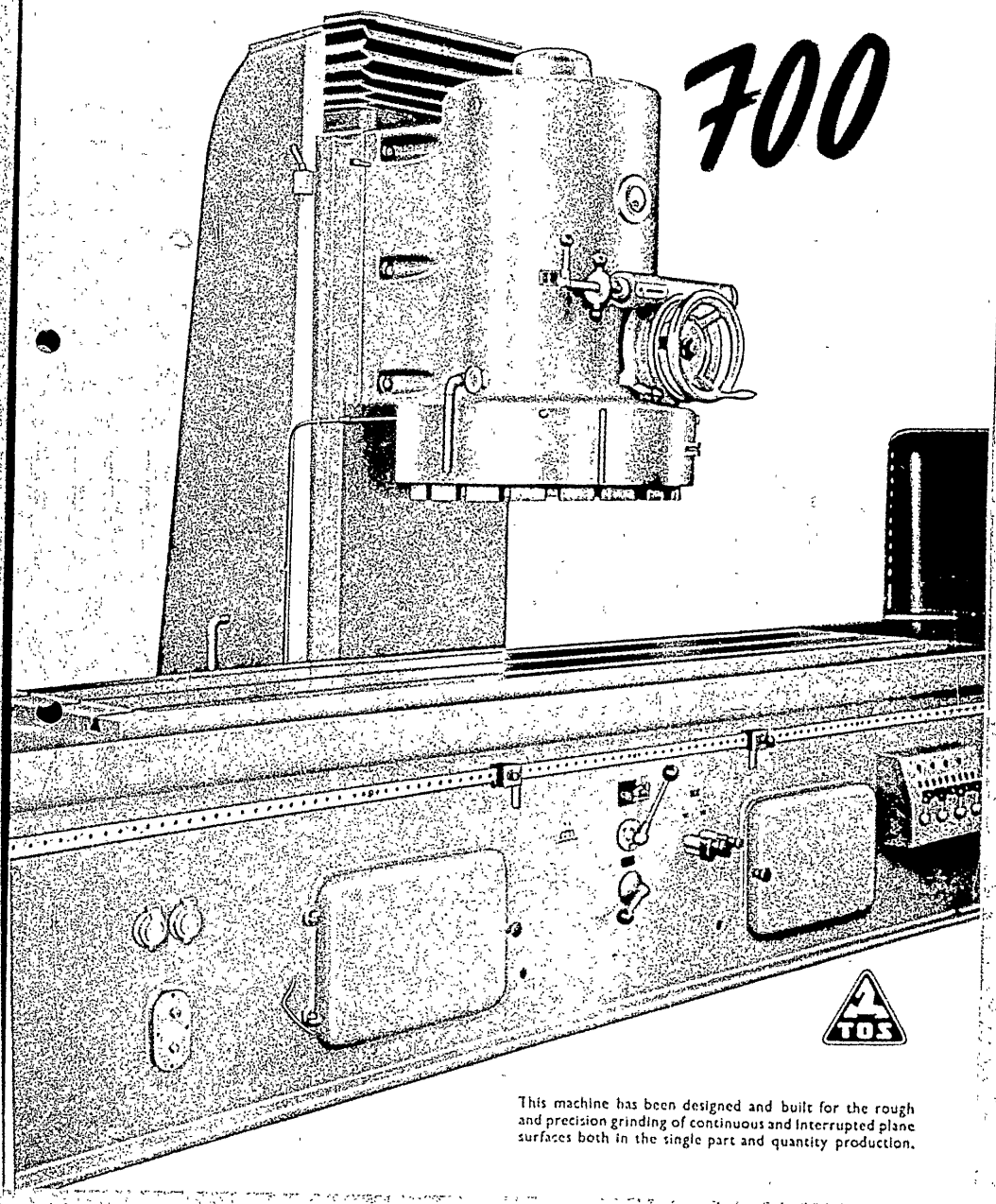
VERTICAL SURFACE GRINDER MODEL 700



This machine has been designed and built for the rough and precision grinding of continuous and interrupted plane surfaces both in the single part and quantity production.

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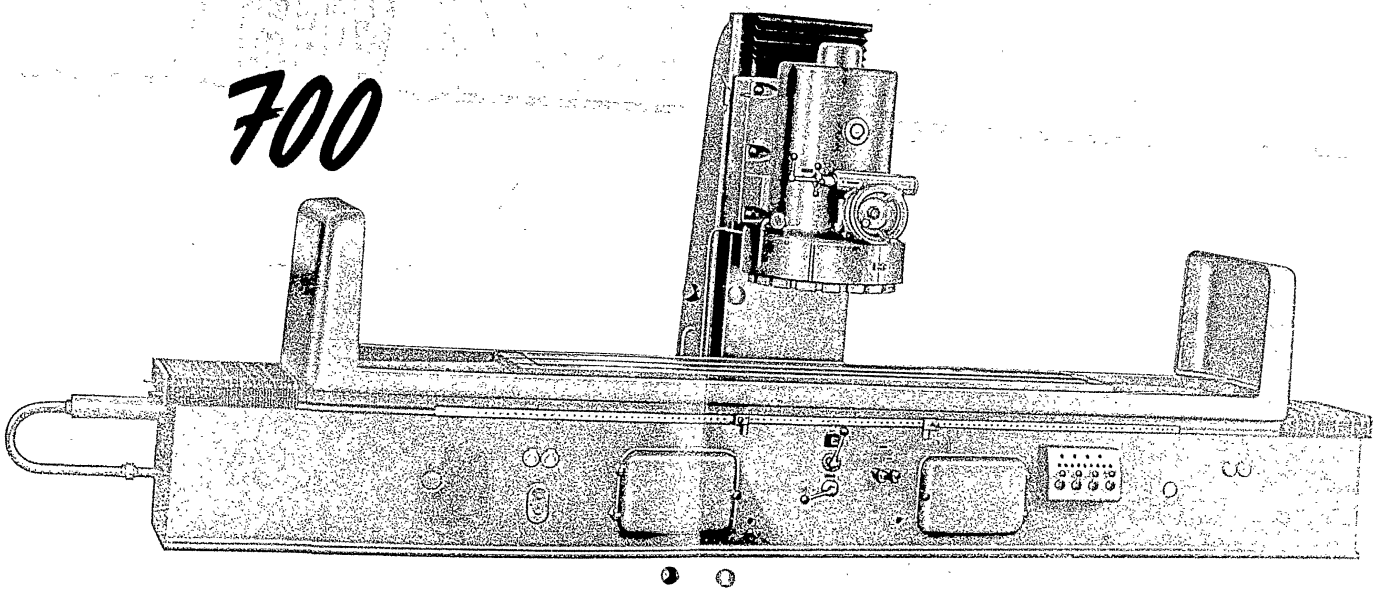
700



WHEELHEAD. The wheelhead is vertically adjustable on flat guideways. A built-in dynamically balanced motor drives the wheel spindle. The vertical rapid travel of wheelhead is by power. For concave grinding the wheelhead may be slightly swung out of its vertical position. In its upper position the wheelhead is secured by a limit switch. The wheel spindle is fed into the cut micrometrically by hand or hydraulically in each table reversal. For precision grinding with power feed the stop dog can be adjusted by means of handwheel with dial. The segmental grinding wheel is carefully balanced.

TABLE. The working surface of table is arranged for clamping directly the work or an electromagnetic chuck which is used in mass production. The table travel is hydraulic and may be limited by adjustable stops.

BED. The flat and V-guides of the bed have automatic pressure lubrication and are protected by dust guards attached to the table.

COLUMN. The wheelhead guides are flat and protected by guards against the entrance of foreign matter. In the lower part of the column are incorporated the oil tank for the hydraulic system, the coolant pump and the electrical equipment. The wheelhead ways are lubricated by pressure oil.

COOLING SYSTEM. The coolant is supplied by an electric pump from the coolant tank inside the column.

ELECTRICAL EQUIPMENT. It consists of the wheel spindle motor, hydraulic pump motor, coolant pump motor, motor for the vertical travel of wheelhead and of protecting contractors remote controlled by push-buttons.

STANDARD EQUIPMENT: Wheel spindle motor, motor for the vertical travel of wheelhead, hydraulic pump motor, coolant pump motor, electrical installation and equipment, set of grinding segments, plain wheel dresser, gauge for the vertical setting of grinding segments, cooling attachments, grease gun, standard and special spanners, demagnetising switch for the electromagnetic chuck, operating instruction booklet.

OPTIONAL EQUIPMENT: Electromagnetic chuck, current rectifier to suit 220 volts 110 volts.

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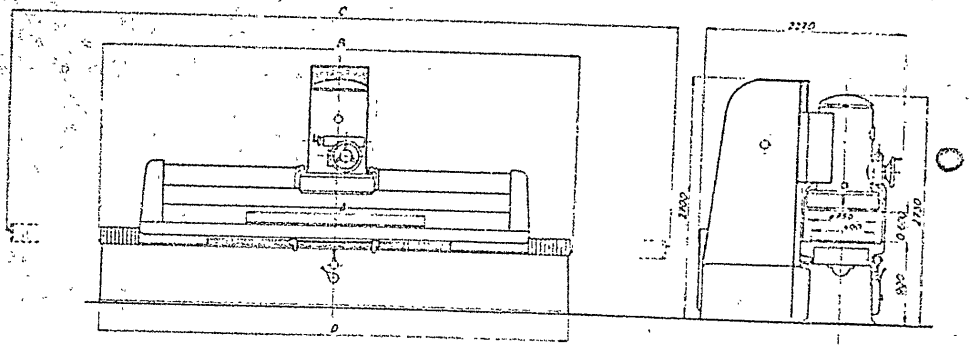
SPECIFICATION

700

Working surface of table	mm	600 × 2000	600 × 3000	23.6" × 78.77"	23.6" × 118"
Maximum width ground	mm	600	600	23.6"	23.6"
Maximum distance, face of grinding wheel to table surface	mm	600	600	23.6"	23.6"
Outer diameter of grinding wheel	mm	750	750	29.5"	29.5"
Longitudinal travel of table	mm	2920	3920	114.96"	154"
Speed of longitudinal table travel (infinitely variable)	m/min.	2—12	2—12	78.6"-472" p. min.	78.8"-472" p. min.
Automatic vertical feed of wheelhead in table reversals, ranging from	mm	0.004—0.1	0.004—0.1	.00016"—.004"	.00016"—.004"
Speed of power vertical travel of wheelhead	m/min.	0.6	0.6	23.6" p. min.	23.6" p. min.
Wheel spindle motor:	r. p. m.	575	575	575	575
	HP	30	30	30	30
Motor for vertical travel of wheelhead	r. p. m.	2800	2800	2800	2800
	HP	3	3	3	3
Hydraulic pump motor:	r. p. m.	1420	1420	1420	1420
	HP	5.5	5.5	5.5	5.5
Floor space required	mm	2370×7850	2370×10,020	93"×309"	93"×393"
Weight of machine: with standard equipment	kg	12,300	13,200	27,060 lbs.	27,040 lbs
with packing	kg	13,100	14,300	28,820 lbs	31,460 lbs
with seaworthy packing	kg	14,000	15,300	30,800 lbs.	33,660 lbs.



Type	A	B	C	D
BPV 700 × 2000	2000	5340	7850	5150
BPV 700 × 3000	3000	6550	10020	6400

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

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Horizontal Surface Grinder
Model BPH 300

This machine is designed for the precision grinding of plane surfaces, even longitudinally stepped, both in individual and mass production.

THE WHEEL SPINDLE is mounted horizontally in adjustable sleeve bearings and vertically adjustable either by power, or micrometrically by hand. Automatic lubrication is provided. The power is transmitted by 2 V-belts from the electric motor through two-step pulleys. By shifting the belt to the second step of the pulley the reduced peripheral speed of the partly worn grinding wheel is compensated.

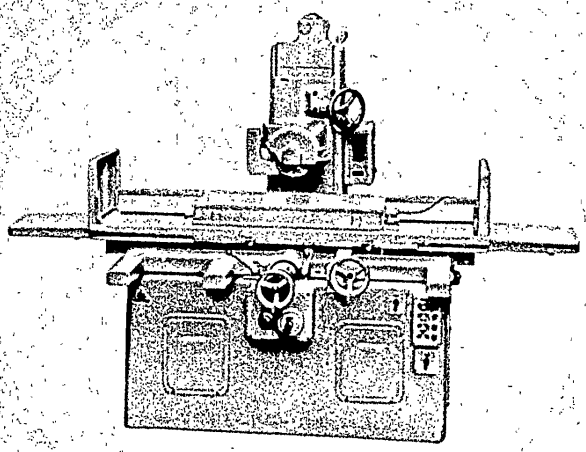
THE TABLE has V-guides at the front and flat ways at the rear. The longitudinal table movement is by hand or hydraulic, infinitely variable. The cross feed proceeds by hand or by power in both table reversals. The extreme positions are limited by electric switches.

THE BED is fitted with two Vee and flat ways for the table cross feed and with a rear guide for the vertical adjustment of the wheel slide. The bed also contains the oil tank for the hydraulic power.

THE ELECTRICAL EQUIPMENT consists of electric motors with dynamically balanced rotors and protective contactors with remote push button control.

STANDARD EQUIPMENT: 3 electric motors with equipment, grinding wheel with balancing flange, balancing arbor, micrometer cross feed, demagnetizing switch for electromagnetic chuck, wheel trueing device mounted on the table, set of spanners, operating instruction booklet.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!



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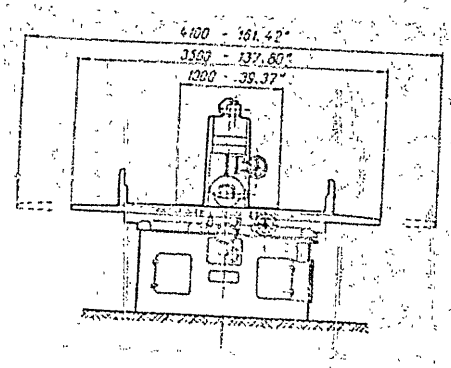
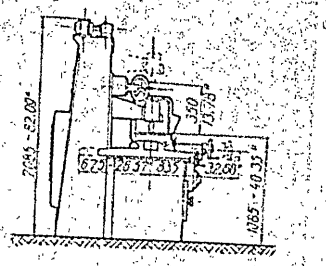
Specification

		Metric	English
Working surface of table	mm	300×1000	11¾" × 39¼"
Dimensions of grinding wheel:			
external diameter	mm	250	9¾"
internal diameter	mm	51	2"
width	mm	25	1"
Minimum diameter of grinding wheel	mm	110	4¼"
Longitudinal travel of table	mm	1060	42"
Cross travel of table	mm	350	13¾"
Vertical travel of headstock (without electromagnetic chuck at minimum dia of grinding wheel)	mm	420	16½"
Speed of longitudinal table motion (infinitely variable)	m/min.	2—16	78"—50' p. min.
Table cross feed ranging from	mm	0.1—2	0.004—0.08
Vertical feed into the cut per 1 division on the indexing ring	mm	0.01	0.0004"
Motor for spindle drive	r. p. m.	2800	2800
	kW	1.6	1.6
Motor for vertical motion of wheel head	r. p. m.	2800	2800
	kW	0.5	0.5
Motor for oil pump	r. p. m.	1400	1400
	kW	1.5	1.5
Floor space required	mm	1625×4100	65" × 161"
Weight of machine with:			
standard equipment	kg	3000	6600 lbs.
railway packing	kg	3350	7350 lbs.
seaworthy packing	kg	3700	8160 lbs.
Volume of packing	m³	10.5	370 cu. ft.

OPTIONAL EQUIPMENT: Dust exhaust attachment, cooling attachment, electromagnetic chuck, rectifier for electromagnetic chuck, balancing stand for grinding wheel, additional flange for grinding wheel.

As improvements in design are continually being made this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.





STROJEXPORT

PRAHA-CZECHOSLOVAKIA

Printed in Czechoslovakia

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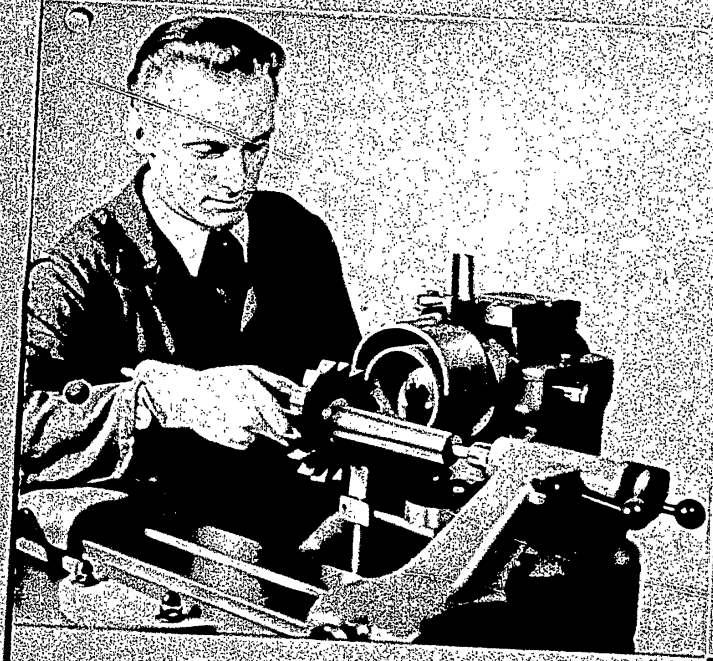
TOS

KAMENÍČEK
UNIVERSAL TOOL AND CUTTER GRINDER



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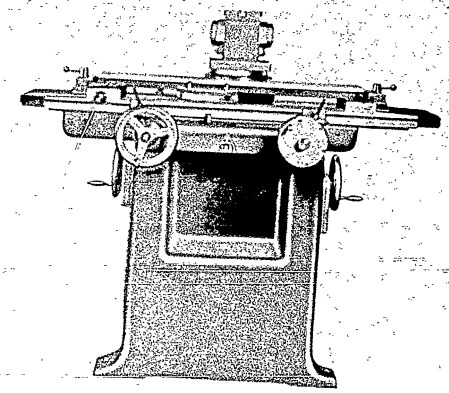
TOS

102 UNIVERSAL TOOL AND CUTTER GRINDER



This machine, together with the supplementary accessories, has been designed and built for grinding a wide variety of cutting tools such as cylindrical and tapered reamers, face and side milling cutters with straight and spiral edges, backed-off cutters, milling heads, taps, counterbores and countersinks, and saws. It is furthermore suitable for grinding of twist drills, cylindrical grinding, internal grinding, the work being clamped either by means of the universal chuck, the magnetic plate or by collets with the possibility of clamping tools having Morse taper No. 0 or 1 in special clamping arbors. The wide range of the complementary equipment available considerably adds to the universal application of the machine, thus enabling it to meet demands laid on a modern tool room machine.

TOS

The machine Proper:

a) THE WHEEL HEAD, of the swivel type, can be vertically adjusted by hand wheels from both sides of the column. The spindle rotates in dustproof precision bearings and is provided with 2 Morse tapers for receiving the grinding wheel mandrels. The spindle drive is by endless Texrope directly from the two-speed electric motor which is vertically adjustable on the column for belt tension.

b) THE CROSS SLIDE carrying the work table is mounted directly on the V-guides of the bed. The cross hand feed is operated by hand wheels with micrometric dials. These hand wheels are located at the front and at the rear of the machine. The guide-ways of the cross slide are adequately protected against the entrance of dirt.

c) THE TABLE: Its lower part is mounted on the cross slide on precision roller chains, a feature which ensures easy and accurate longitudinal movement. The upper part is adjustable on dials for taper grinding. The rapid travel of the table is controlled by a crank while slow feed is actuated at the front over the differential. When the drive is disengaged the table can be easily moved by hand. The table travel is controlled by dogs functionning as movable or positive stops.

NORMAL ACCESSORIES:

d) THE WORK HEAD is arranged to swivel in horizontal and vertical planes. The amount of swivel can be read on the accurately graduated scales. The spindle head is graduated for setting the cutting angles. The spindle is fitted to receive metric taper No. 60 at the one and Morse taper No. 5 at the other end with the distinct possibility of altering the taper by means of reducing sleeves. To lock the wheel head on the table takes a minimum of time. The same applies to the clamping of the ancillary equipment. With a view enabling the grinding of larger diameters, the wheel head can be raised by means of the head block, thus bringing the height of centres from 130 mm (5") to 180 mm (7"). The spindle head is provided with slots on its both sides for clamping the tooth rests and various special attachments and fixtures.

e) TAILSTOCKS: As these are in precision alignment with the working spindle axis, either both tailstocks or one tailstock combined with the working spindle can be used for clamping the workpiece. The centre sleeve of the left-hand tailstock is stationary, that of the right-hand tailstock movable. The pressure of the centre upon the workpiece to be ground is controlled by spring.

f) EQUIPMENT OF THE MACHINE: The machine is equipped with mandrels, grinding wheels and flanges, ejection arbor, with necessary spanners and pressure gun.

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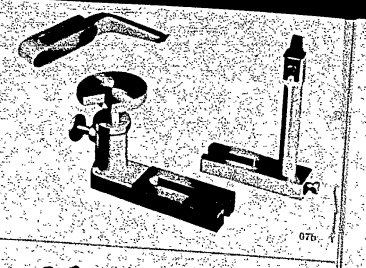
STANDARD EQUIPMENT:
Fig. 05-07c

OPTIONAL EQUIPMENT:
Fig. 10-26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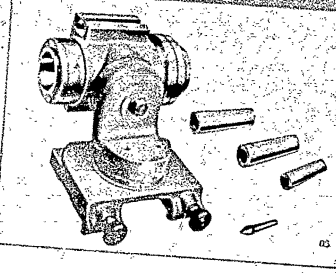
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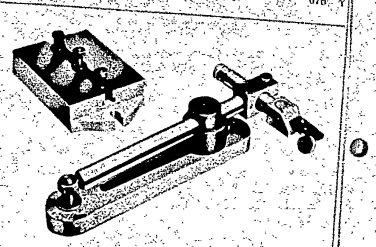
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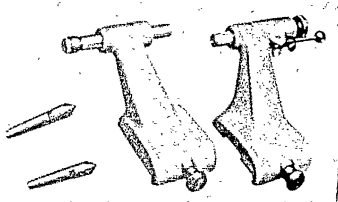
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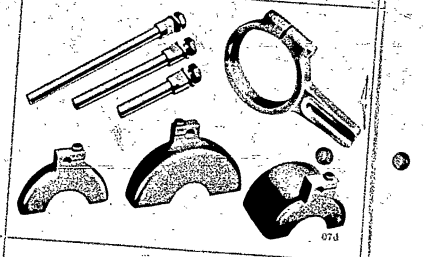
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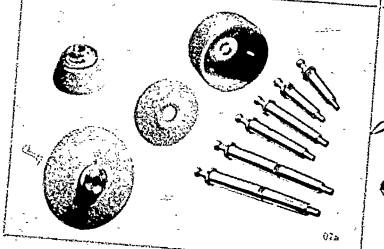
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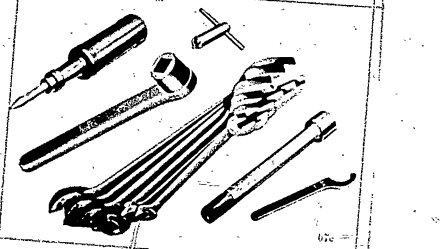
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TOS

STANDARD EQUIPMENT:

- 05 Workhead, reduction sleeve
- 06 Right-hand and left-hand tailstock
- 07a Mandrels, flanges and grinding wheels
- 07b Gauge, tooth-rest, support
- 07c Adjustable base plate, universal tooth-rest
- 07d Wheel guards and wheel guard holders
- 07 Spanners, pressure gun, ejector rod

SPECIAL EQUIPMENT:

- 10 Cylindrical grinding attachment
- 11 Internal grinding attachment
- 12 Vice for surface grinding attachment
- 13 Long reamer grinding attachment
- 14 Backed-off face mill sharpening device
- 15 Roughing reamer grinding attachment
- 16 Attachment for the grinding of carbide-tipped tools
- 17 Twist-drill grinding attachment
- 18 Dividing attachment
- 19 Dust exhausting attachment
- 20 Magnetic chuck
- 22 Milling cutter radius grinding attachment
- 23 Collet chuck attachment
- 24 Attachment for grinding small diameter tools with Morse taper
- 25 Radius grinding attachment for the grinding of cutting tools
- 26 Cutter head grinding attachment

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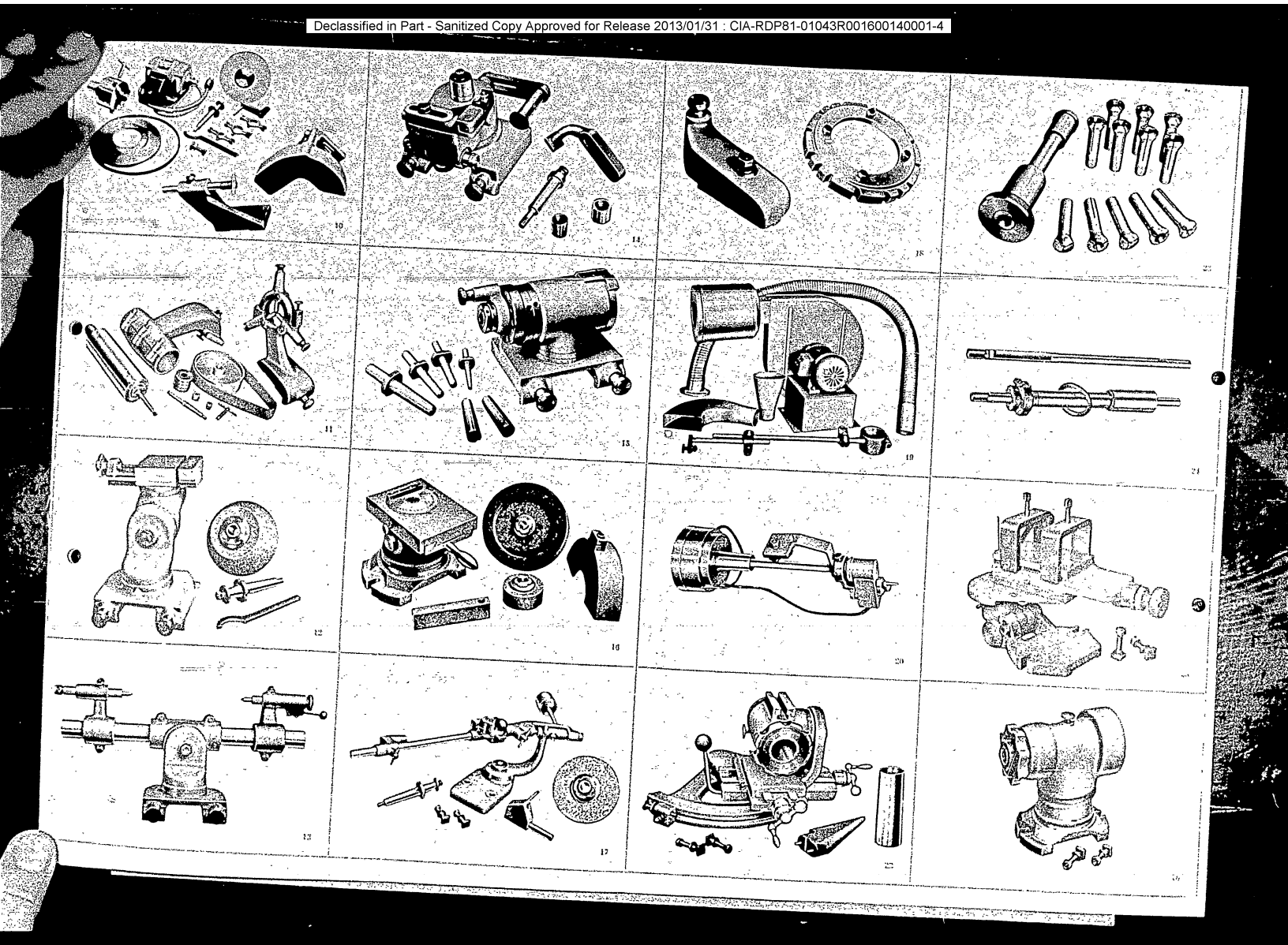

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SPECIAL EQUIPMENT:

10. THE CYLINDRICAL GRINDING ATTACHMENT enables grinding of cylindrical and tapered surface as well as faces of tools and small components of fixtures. Grinding is effected either between centres, centre and chuck, or exclusively in the chuck. The cylindrical grinding attachment has an electric motor of its own, a chuck of 115 mm (4.5") dia., an arbor with flange and grinding wheel, a wheel dressing device, 3 carriers and a spanner.

11. THE INTERNAL GRINDING ATTACHMENT supplements the cylindrical grinding attachment. It is supplied with a special spindle for internal grinding (A 20) of 70 mm (2.8") outside diameter and a 3-jaw workrest. Internal grinding is possible already from 15 mm (0.6") diameter upwards.

12. THE VICE FOR SURFACE GRINDING ATTACHMENT. Comprises the base plate, two swivel brackets and the vice. This attachment enables adjustment of the work to any position with regard to the grinding wheel. It is used to advantage for the grinding of turning and planing cutters, straight treading dies, gauges, etc. It is also possible to assemble the vice directly on the base plate, or to use but one bracket. Width of jaw is 100 mm (4"), depth 20 mm (0.8"), maximum span 50 mm (2"). It is provided with an arbor with inserts and a grinding wheel.

13. THE LONG REAMER GRINDING ATTACHMENT is intended for the clamping of long tools, e. g. reamers, which, on account of their length, cannot be accommodated between the tailstock centres. This attachment is available in two executions, of 400 (15.7") and 800 mm (31.5") length. In ordering the long reamer attachment, kindly indicate the desired length. The workpiece is clamped between two centres, of which one is spring operated.

14. BACKED-OFF FACE MILL SHARPENING DEVICE. Is used to advantage whenever the tool has to be set up very accurately against the grinding wheel so as to obtain correct tooth profile.

15. ROUGHING REAMER GRINDING ATTACHMENT. This attachment is specially adapted for backed-off grinding of reamers up to 50 mm (2") diameter. Reamers with taper shank are clamped in the attachment either directly in the Morse No. 3 taper or by means of reduction sleeves in case of a No. 1 or 2 taper. Shell reamers may be clamped in four clamping arbors with taper hole 1 : 30, there is the distinct possibility of clamping in holes 13 (0.5"), 16 (0.6"), 19 (0.7") and 22 mm (0.8"). The scale for the adjustment of the tool with regard to the diameter of the tool has been set to what practice has proven to be the most efficient angle, i. e 60° for scutting edges and an angle of 6° for lips.

16. ATTACHMENT FOR THE GRINDING OF CARBIDE-TIPPED TOOLS. The tool is placed on the support which, being linked to the base, can be adjusted to any position in respect of the grinding wheel. This attachment is supplied with flanges and grinding wheels for hard metals and a wheel dressing device.

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17. TWIST-DRILL GRINDING ATTACHMENT. Is intended for the grinding of twist-drills from 5 (0.2") to 25 mm (1"). Supplied with the attachment is a special arbor with flange, a grinding wheel and a wheel dressing device.

18. DIVIDING ATTACHMENT. Mounted on the working spindle, this attachment enables the division of the cutter perimeter in the desired number of teeth. It is also used to advantage for the sharpening of cutters. Grinding wheels with division 2 (0.08"), 4 (0.16"), 6 (0.24"), 8 (0.31") and 12 (0.47") are supplied for use with the attachment. Further grinding wheels with division 5 (0.2"), 7 (0.28"), 9 (0.35"), 10 (0.39"), 11 (0.43"), 13 (0.5"), 14 (0.55"), 15 (0.59"), 16 (0.63"), 17 (0.67"), 18 (0.7"), 19 (0.75"), 20 (0.79"), 22 (0.87"), 24 (0.94"), 28 (1.1"), 32 (1.26"), 36 (1.42") and 60 (2.36"), 70 (2.76"), 80 (3.15") are delivered to customer's order and against extra charge.

19. THE DUST-EXHAUSTING ATTACHMENT is equipped with a motor of its own as well as with a special holder so that the suction nozzle (in two different executions) can be adjusted to suit the particular profile of any grinding wheel used.

20. THE MAGNETIC CHUCK COMPLEMENTS the cylindrical grinding attachment. The magnetic chuck has a diameter of 150 mm (6"). On special request, this accessory is supplied with a rectifier assembled directly on the machine. Unless expressly specified otherwise, the magnetic chuck is supplied without rectifier.

22. MILLING CUTTER RADIUS GRINDING ATTACHMENT. This attachment is especially adapted for chamfering the edges of milling heads and for chamfering face milling cutters up to a 300 mm (12 in.) diameter.

23. COLLET CHUCK ATTACHMENT. Is intended for quick-gripping of small tools with shank tapers. Supplied as normal accessory is a 20 mm (0.8") diameter collet. Collets ranging from 6 mm (0.2") to 20 mm (0.8") are supplied to customer's order and against extra charge.

24. ATTACHMENT FOR GRINDING SMALL DIAMETER TOOLS WITH MORSE TAPER NO. 0 AND 1. During grinding the table is secured in position by stops, the movement being confined to the bar and the tool within the limit set by means of the adjustment ring.

25. RADIUS GRINDING ATTACHMENT FOR THE GRINDING AND CUTTING TOOLS. This attachment has been designed for the chamfering of turning tools. The turning tool is clamped with the aid of fixtures, of which one is provided with an adjustable stop dog enabling quick-gripping of turning tools having the same diameter and radius.

26. CUTTER HEAD GRINDING ATTACHMENT. This attachment serves for the backed-off grinding of cutter heads up to 380 mm (1'3") in diameter which cannot be machined by means of the work head. The cutter head is especially adapted for the backed-off grinding of facing tools, profiling tools as well as for backed-off grinding of edges.

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SPECIFICATIONS

Swing over table	mm	220 (11")
Swing over table (with raising blocks)	mm	370 (1'3")
Length between workhead and tailstock centres	mm	500 (1'8")
Length between right and left-hand tailstock centres	mm	690 (2'3")
Tailstock centre above table	mm	130 (5")
Tailstock centre offset from rear table edge	mm	55 (2.2")
Taper of workhead spindle	metric	60
	Morse	5
Horiz. distance - centre tailstock to centre of wheel head: maximum	mm	315 (1'0.4")
minimum	mm	75 (3")
Vert. distance - centre tailstock to centre of wheel head: maximum	mm	175 (7")
minimum	mm	55 (2")
Standard dimensions of grinding wheel, external diameter	mm	150 (6")
internal diameter	mm	20 (0.8")
width	mm	15 (0.6")
Maximum dimensions of grinding wheel: external diameter	mm	200 (8")
internal diameter	mm	32 (1.3")
width	mm	20 (0.8")
Diameter of spindle for internal grinding	mm	70 (2.8")
Diameter of jaw-chuck	mm	115 (4.5")
Diameter of magnetic chuck	mm	150 (6")
Workhead swivels horizontally and vertically		360°
Table swivels		90°
Fine swivel movement of table on a dial		9°
Swivel movement of grinding wheelhead		350°
Vertical movement of grinding wheelhead	mm	230 (9")
Longitudinal movement of table (by hand)	mm	420 (1'5")
Cross movement of table (by hand)	mm	240 (9.5")
Working surface of table	mm	920 × 140 (3' × 5.5")
Range of wheel spindle speeds	r. p. m.	2800 ÷ 5600
Motor of wheel spindle drive: Speed	r. p. m.	1400 · 2800
Output	kW	0.7 ÷ 1.2
Floor space required	mm	1485 x 1860 (4' 10" × 6'1")
Weight of machine, with standard equipment	kg	1000 (2200 lb.)
with packing	kg	1065 (2343 lb.)
with seaworthy packing	kg	1370 (3014 lb.)
Contents boxed	m³	3.5 (124 cu. ft.)

In ordering, specify voltage, phase and frequency of power supply!
As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alterations without notice.

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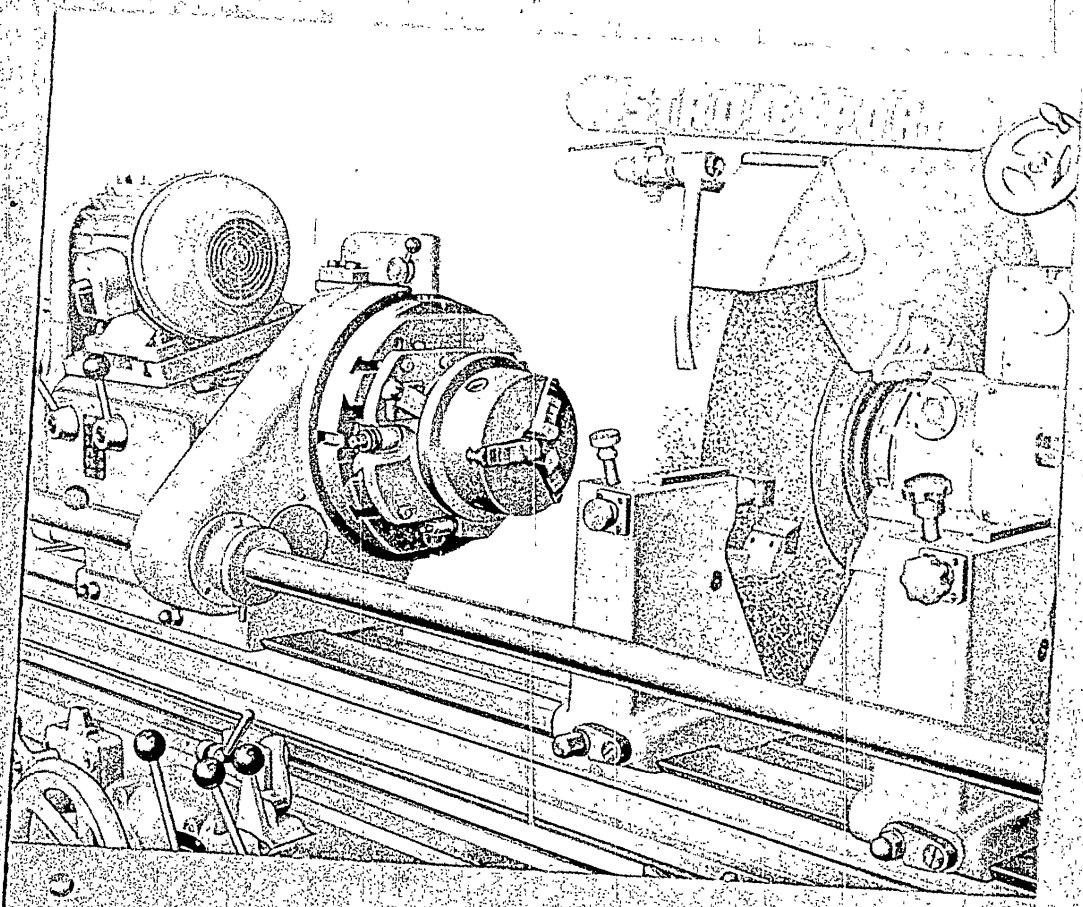

7C10

CRANKSHAFT GRINDING MACHINE

TOS

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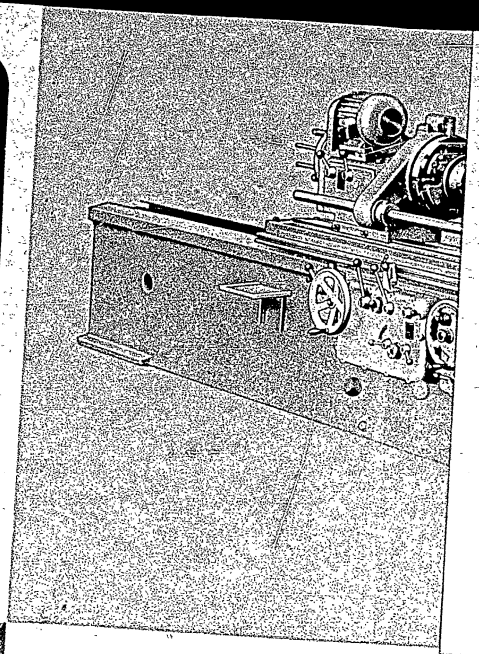
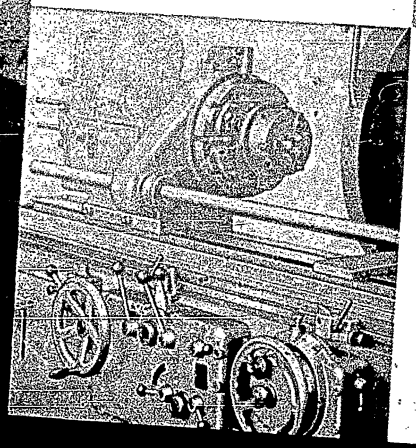
CRANKSHAFT GRINDING MACHINE





This heavy duty precision machine of the double head type is designed specially for grinding the pins and journals of crankshafts in series production as well as for re-grinding worn crankshafts.

Sensitive hydraulic table traverse and infeed are fitted to meet all the requirements of the highest possible finish and accuracy of the ground pins and journals

The workhead and tailstock are of the combined live and dead center type. They are longitudinally adjustable on the table

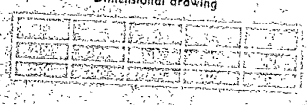
Standard equipment:

Workhead and tailstock with synchronized work spindles arranged for adjusting the eccentricity of scroll chuck - 2 three-jaw chucks O. D. 200 mm - 2 centres - 2 steadies, width 50 mm - straight trueing device (steady type) without diamond - radius trueing device (steady type) without diamond - wheelhead with axial wheel feed (with built-in indicator) - grinding wheel O. D. 910×75 mm with balancing flange - wheelguard - extra sheave for worn wheels - balancing arbor - wheel puller - locating attachment for coarse setting of crankpins - 20 balancing weights - measuring plate - positive stop for table hand traverse - bed levelling plate - 1 set of foundation plates for levelling the bed - electrical equipment with 4 motors to suit 3-phase, 380 volts, 50 cycles current supply with protective contactors and remote push-button control - coolant pump with tank and piping - splash guards - 1 set of belts - 1 set of spanners - operator's instruction booklet.

Optional equipment:

Steady crank holders instead of adjustable chucks supplied on hand of drawings of crankshafts to be ground in series production - spacing block for setting the crankpin distances in series production (without template) - radius trueing device (table type) without diamond - additional steady - narrow steady (30 mm) - additional flanges for wheels 32—43 mm wide - crankpin stroke setting gauge-wheel balancing flange - spot light electric motor and electrical equipment for voltage other than 380 volts, 50 cycles on request.

Dimensional drawing



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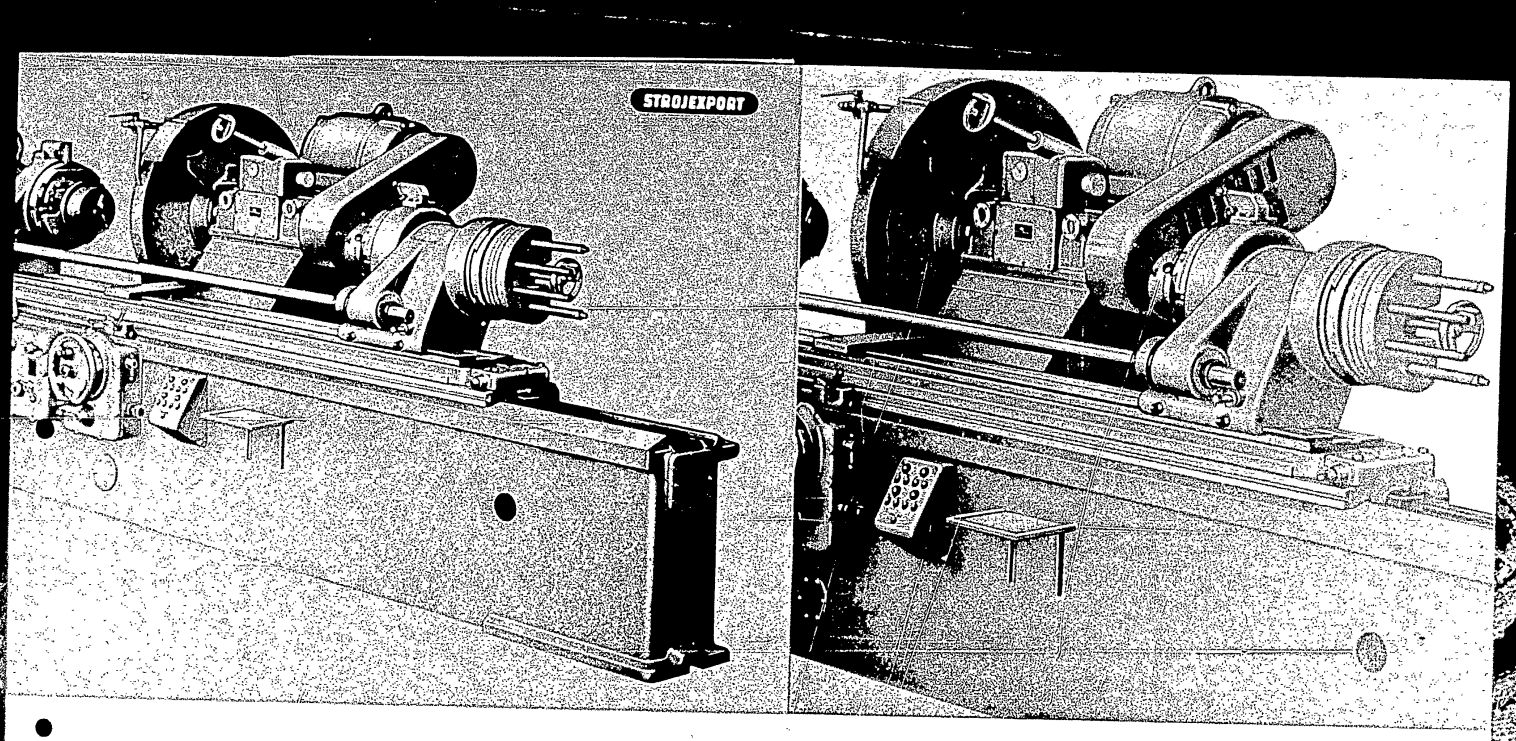

by rack and pinion. The synchronized work spindles run in precision anti-friction bearings and are fitted with carrier plates with guides for the cross adjustment of the chucks. Balancing weights on the outer end of the workhead and tailstock live spindles are easily adjusted to balance all types of crankshafts when grinding crankpins. The work speed is changed by sliding gears. The tailstock center sleeve is adjusted by a hand wheel and the center pressure upon the workpiece is regulated by spring tension. The carrier plate on the tailstock is driven by a shaft from the workhead.

The wheelhead moves on the cross slide travelling on the bed guides. The cross traverse as well as the extremely sensitive and definite feed to the wheel is carried out by hand and hydraulically, the latter being done automatically either at the left or right or at both table reversals, or in plunge cut grinding independent of table motion. Hydraulic rapid traverse of wheelhead cross slide ensures high economy of production.

The grinding wheel spindle is mounted in plain bearings and may be finely adjusted in the axial direction. It is driven by V-belts from a selfcontained electric motor. Automatic lubrication is provided.

The table is of the compound type. Its lower part rides in the bed ways, its upper part is adjusted on a scale for taper grinding. Table traverse is carried out by hand and hydraulically and may be limited by finely and coarsely adjustable stops. Tarry at each end of the stroke may be adjusted within a range of 0,5 seconds. The lowest table stroke rate of the adjustable table oscillation is 1 mm (0,04 inch).

The bed has prismatic and flat guideways for table and wheel head cross slide. The lower part of the bed is made as a hydraulic oil compartment.

The cooling. The coolant is supplied by an electric pump from a tank located outside the machine.

The electrical equipment consists of: workhead motor, wheelhead motor, hydraulic pump motor and coolant pump motor. All these motors are provided with protective contactors with remote push-button control.

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SPECIFICATIONS

		Metric		English	
Maximum swing over table	mm	600		23.6"	
Maximum distance between scroll chucks	mm	2 100	2 650	84.5"	106"
Maximum distance between center	mm	2 400	2 970	94.3"	116"
Maximum eccentricity of crankpin	mm	120		4.73"	
Maximum swing in workrest	mm	130		5.1"	
Grinding wheel:					
Diameter × face × hole	mm	910 × 75 × 305		35.8" × 2.95" × 12"	
Minimum-maximum face	mm	32—75		1.25"—3"	
Workhead – Tailstock:					
Taper of workhead center	metric No.	70		70	
Taper of tailstock center	Morse	5		5	
Diameter of scroll chuck	mm	200		7.87"	
Work spindle speeds		6		6	
Speed range of work spindle	r. p. m.	18—180		18—180	
Workhead motor: Speed	r. p. m.	1 400		1 400	
Output	kW	1.5		1.5	
Wheelhead:					
Maximum travel of wheelhead cross slide	mm	145		5.7"	
Rapid traverse of wheelhead cross slide (hydraulic)	mm	170		6.7"	
Head may be moved back on slide	mm	320		12.6"	
Automatic infeed:					
a) at left or right or at both table reversals reduces the diameter ground by	mm	0.005—0.05		0.0002"—0.002"	
b) in plunge cut grinding (independent of table motion)	mm/min.	0.05—4		0.002"—0.16"	
Axial feed of wheel spindle	mm	± 8		± 0.31"	
Speed of full size (worn out) wheel	r. p. m.	665/790		665/790	
Wheelhead Motor: Speed	r. p. m.	955		955	
Output	kW	15		15	
Table:					
Swivels in both directions		4.2°	3.6°	4.2°	3.6°
Maximum tapers ground		1 : 6.6	1 : 8	1 : 6.6	1 : 8
Maximum longitudinal table movement	mm	2 650	3 150	104"	124"
Minimum longitudinal table movement (hydr.)	mm	1		0.4"	
Table speed (hydr.) infinitely variable	m/min.	0.1—5		4"—197"	
Hydraulic pump motor. Speed	r. p. m	1 410		1 410	
Output	kW	3		3	
Coolant pump motor: Speed	r. p. m	2 800		2 800	
Output	kW	0.25		0.25	
Shipping data:					
Floor space required, width	mm	2 645		104"	
length	mm	7 500	8 600	295"	338"
Weight of machine with standard equipment	kg	10 000	12 000	22 100	26 500 lbs
with seaworthy packing	kg	11 500	13 600	25 400	30 460 lbs
Size of case (seaworthy packing): length	cm	710	800	280"	315"
width × height	cm	250 × 220		98.5" × 86.5"	

All above data, dimensions and illustrations are not binding.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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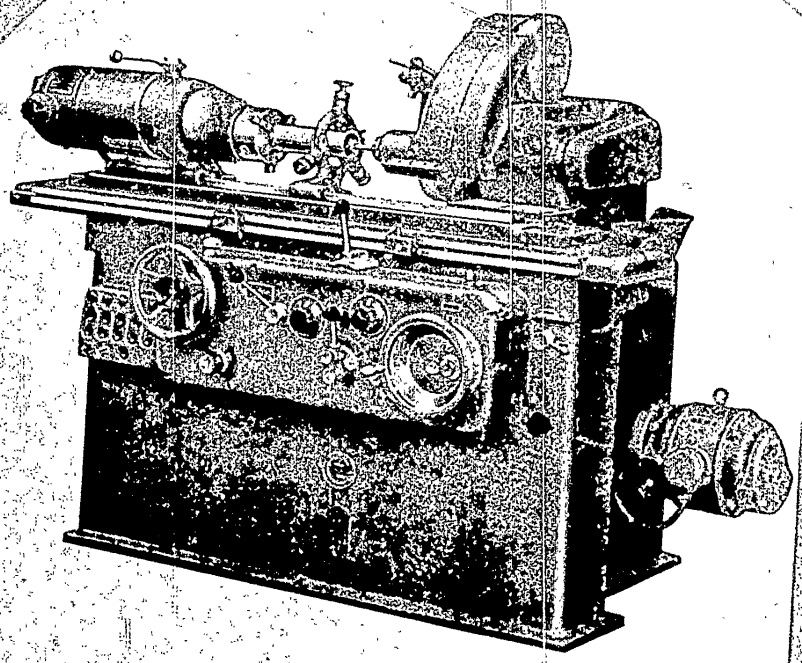

ZBROJOVKA

UNIVERSAL HYDRAULIC

CYLINDRICAL

GRINDING MACHINES

BK3
BK5

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BK3
BK5

These up-to-date machines are capable of grinding cylindrical surfaces between dead centres or in chuck. The swinging-frame internal grinding attachment enables holes to be ground.

OUTSTANDING FEATURES

Infinitely variable speed of hydraulically operated table traverse.

Adjustable time of stopping the table in reversals—Feed of grinding wheel in reversals—Plunge cut grinding—Rapid withdrawal and approach of grinding wheel—Single lever control—Wheelhead slide feed movement controlled by hand wheel and inch movement controlled by push-button.

Description

Bed is sturdy and well ribbed to provide stability under the heaviest cuts. The guideways for the table are protected from dirt and splash and lubricated automatically by rollers.

Table consists of two parts. The upper table swivels through 6 degrees. The amount of swivel can be read from a graduation. The table traverse is effected by hand and is automatic. The manual feed is either normal or fine. The speed of the automatic table feed is infinitely variable. The feed movement is quiet and the reversing of the table in reversals is smooth. The time of stopping the table in reversals is adjustable for length and can be selected to take place either in the right-, left-hand direction or in both reversals.

Wheelslide moves on slides which, in turn, are pivoted on the base. Backlash in the gear transmission is eliminated hydraulically.

The bearing surfaces are lubricated automatically by means of oil from separate container.

Wheelhead can be traversed on the slide by means of gears.

The spindle runs in adjustable plain bearings.

Lubrication is effected by an oil pump drawing oil from an integral container.

Both automatic and hand feed to the grinding wheel are provided. When setting up the machine or while a finishing cut is being effected an additional hand feed of 0.005 mm of the grinding wheel is obtainable through a special push-button.

The automatic feed takes place either in the reversal (the feed is dependent on the table movement) or while using the plunge cut grinding method (in this latter case the feed is independent of the table movement).

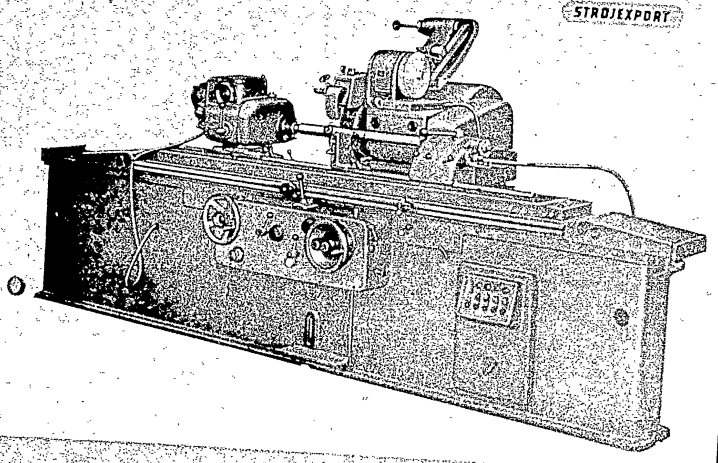
The feed can be selected to operate either in the left-hand, right-hand or in both reversals.

For each of the two modes of automatic feed of the grinding wheel the feed rate can be adjusted within a range of from 0.0025 to 0.0175 mm.

For the independent feed, in addition, the speed can be adjusted within 0.05 to 1.4 mm/min.

Rapid withdrawal of the grinding wheel from the work is effected by means of a hand lever.

The subsequent approach to the component being ground is held within the accuracy limits of ± 0.001 mm.



Workhead is standard for both external and internal grinding operations and can be swivelled through 60 degrees. The spindle is mounted on adjustable plain bearings. An oil pump has been provided for lubrication.

Poolstock. The Model BK-3 is equipped with a standard design, lever actuated footstock. The centre is held to the workpiece by means of a spring pressure. With the Model BK-5 the footstock is operated hydraulically by means of a foot lever.

Centrifugal coolant pump is firmly connected to the motor. The coolant container is situated outside the machine to provide easy access for cleaning purposes.

Motors are protected by contactors fitted with thermal overloads and controlled through push-buttons.

Operation of the machine is extremely simple, all controls are grouped on the control panel.

Standard equipment

2 Morse centres—a grinding wheel and balancing flange—a pulley and flange puller—an open steadyrest—a closed steadyrest—a diamond holder without diamond—a balancing mandrel—set of spanners—guards—motors to operate on 380 V, 50 c/s—complete electrical equipment—a grease gun—and an operator's instruction handbook.

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SPECIFICATION

	BK 1		BK 5	
Height of centres	19.69"	29.53"	39.37"	59.06"
Maximum distance between centres	5.12"	5.12"	6.30"	6.30"
Maximum swing diameter	19.69"	29.53"	39.37"	59.06"
Grinding wheel (diameter×bore×width)	9.84"	9.84"	12.40"	12.40"
Work speeds r.p.m.	13.78"×2.36"×5.01"		19.69"×7.89"×2.95"	
	50—750		25—30—60—95—150—240—380—600	
Table traverse in./min	0.04"—0.32"		0.04"—0.24"	
Minimum table traverse when operated hydraulically	0.12"		0.12"	
Maximum traverse of table	29.53"	35.43"	46.07"	65.75"
Grinding wheel speed r.p.m.	1850		1150	
Taper in work spindle No.	4 Morse		4 Morse	
Taper in footstock No.	3 Morse		4 Morse	
Swivel of table	6°	5°	6	5°
Swivel of workhead	90°		90°	
Swivel of wheelhead	30°		30°	
Wheelhead slide traverse operated by hand wheel	3.54"		5.52"	
Rapid traverse of wheelhead within	1.58"		1.58"	
Traverse of wheelhead on slide	3.94"		5.52"	
Automatic feed of grinding wheel in reversal	0.0002"—0.012"		0.0002"—0.012"	
Independent automatic feed in./min	0.002"—0.04"		0.002"—0.04"	
Total power of motors kW	5.7		7.6	
Weight approx.	4,630 lbs	5,071 lbs	7,667 lbs	8,488 lbs
Length of machine × height	75"×51"	101"×51"	122"×55"	157"×55"
Floor space required	98"×59"	130"×60"	142"×83"	197"×83"
Coarse feed of table 1 rev. of hand wheel	1"	1"	1"	
Fine feed of table per 1 rev. of micrometric screw	0.04"		0.01"	

Extra equipment

1. Swinging frame internal grinding attachment, fixed to the wheelhead, including internal grinding spindle and extension.
2. Further extensions.
3. Quick grip collet chuck attachment.
4. Collets from —.24" — —.79" diameter.
5. Stand for balancing grinding wheels.
6. Micrometric stop.
7. Three-jaw chuck and back plate.
8. Spot light.
9. Electromagnetic chuck ⌀ 200 mm with rectifier 220 V 50 c/s.

When ordering, specify voltage, phase, and frequency of power supply!

As we are constantly developing and improving the design of our machines we reserve the right to incorporate modifications when necessary and without notice.

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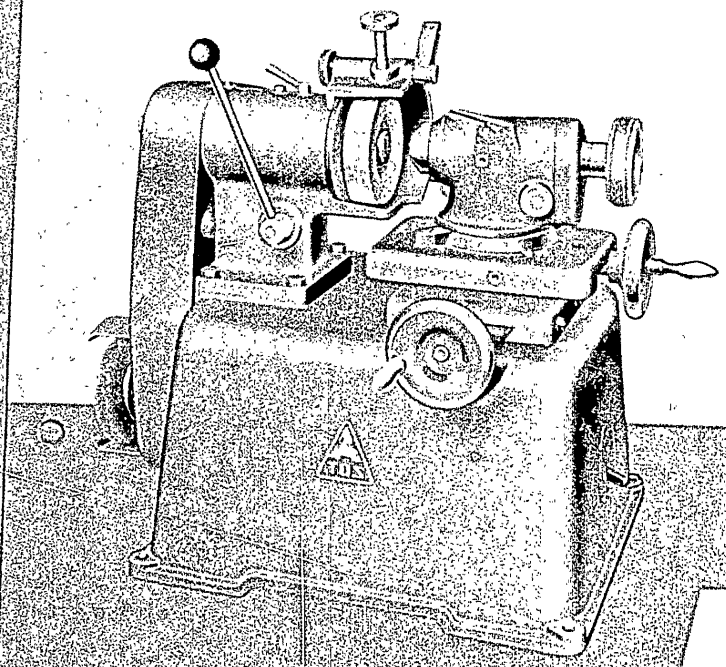


VALVE GRINDING MACHINE Type BV

The machine is intended for the grinding of the bevelled seating surface of internal combustion engine valves; it is marked by a design which is simple, yet remarkably well fitted to its purpose, and by a high degree of precision.

The wheel spindle runs in two sturdy radial ball bearings mounted in a sleeve which can be moved radially by means of a hand lever and locked in its set position by a handle. The spindle is driven by an electric motor fitted separately in the stand by means of an endless woven belt. The belt is tightened by an adjustable tightening pulley.

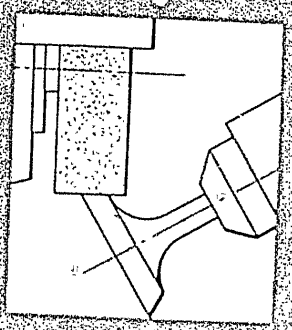
The workhead swivels round a pin fitted in the upper slide. The angle of swivel can be read on a scale. The head is locked in its set position by a clamp. The position for the grinding of a standard 90° taper can, in addition, be locked by a removable pin. The work spindle is driven from the motor by a V-belt, through a countershaft, a flexible shaft and a worm gear. The spindle runs in a plain bearing.

The slides of the workhead are carried in wide and long V-ways the play of which is easy to adjust. The valves are chucked, at both sides, in interchangeable collets by means of a handwheel. The machine is also suitable for grinding the valve stem face by inserting the valve stem into the prismatic guideway at the top of the workhead set at the normal angle of 45°, rotating it and pressing it lightly against the face of the grinding wheel.

A circular wire brush is arranged at the left-hand side of the stand for the cleaning of the valve of carbon before grinding. For the trueing of the grinding wheel to the proper diameter a wheel dresser is supplied with the machine. It is inserted into the opening in the grinding wheel guard. Trueing is done by moving the wheel on the wheel head.

For face trueing a lever with a pin is used which is inserted into the opening in the grinding wheel guard and locked by a nut. Before the face trueing operation is started the wheel spindle is secured against axial movement by being locked in its rear position by means of the lever on the wheel head. The trueing is done by swinging the lever on the wheel guard and, simultaneously, tightening the wheel dresser by means of its screw.

All moving parts are lubricated by means of oil nipples into which oil is pressed by an oil gun which is supplied with the machine. The general design of the machine is such that a compact, enclosed unit has been obtained. The moving parts are protected from dust so that the machine is easy to clean and the rate of wear of the whole machine is extremely low.



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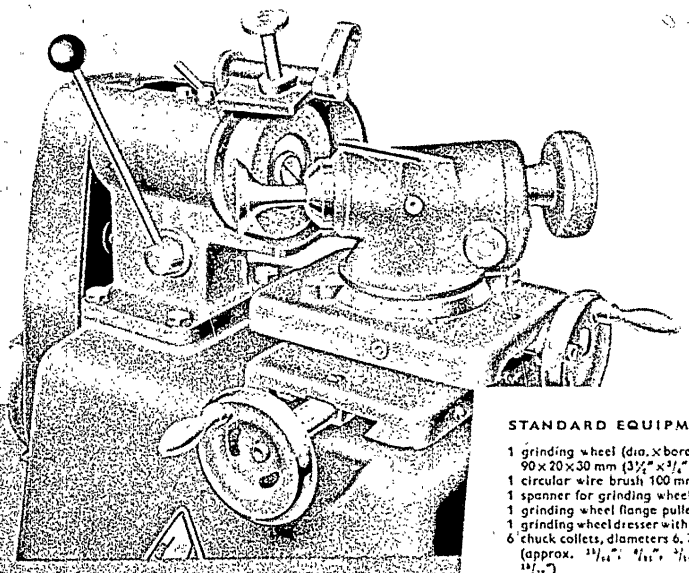

STANDARD EQUIPMENT

1 grinding wheel (dia. × bore × width) 90 × 20 × 30 mm (3½" × ¾" × 1 3/16")
1 circular wire brush 100 mm (4") dia.
1 spanner for grinding wheel flange
1 grinding wheel flange puller
1 grinding wheel dresser with lever, pin and nut
6 chuck collets, diameters 6, 7, 8, 9, 10, 12 mm (approx. 15/64", 9/32", 5/16", 11/32", 25/64", 15/32")
1 oil gun
1 equipment cabinet
1 operating instruction booklet

SPECIFICATION

Maximum diameter of workpiece	mm	100	3 11/16"
Chucking range, diameter	mm	6 to 15	15/64" to 37/64"
Work head swivel			60°
Work spindle speed, approx.	r. p. m.		50
Cross travel of work spindle	mm	80	3 1/8"
Longitudinal travel of work spindle	mm	90	3 1/8"
Dimensions of grinding wheel, dia. × bore × width	mm	90 × 20 × 30	3½" × ¾" × 1 3/16"
Grinding wheel speed, approx.	r. p. m.		5000
Diameter of circular wire brush	mm	100	4"
Output of motor	kW		0,2
Dimensions of machine: length	mm	515	20½"
width	mm	380	15"
height	mm	415	16½"
Weight of machine with standard equipment, approx.	kg	60	132 lbs

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

As improvements in design are continually being made, the above specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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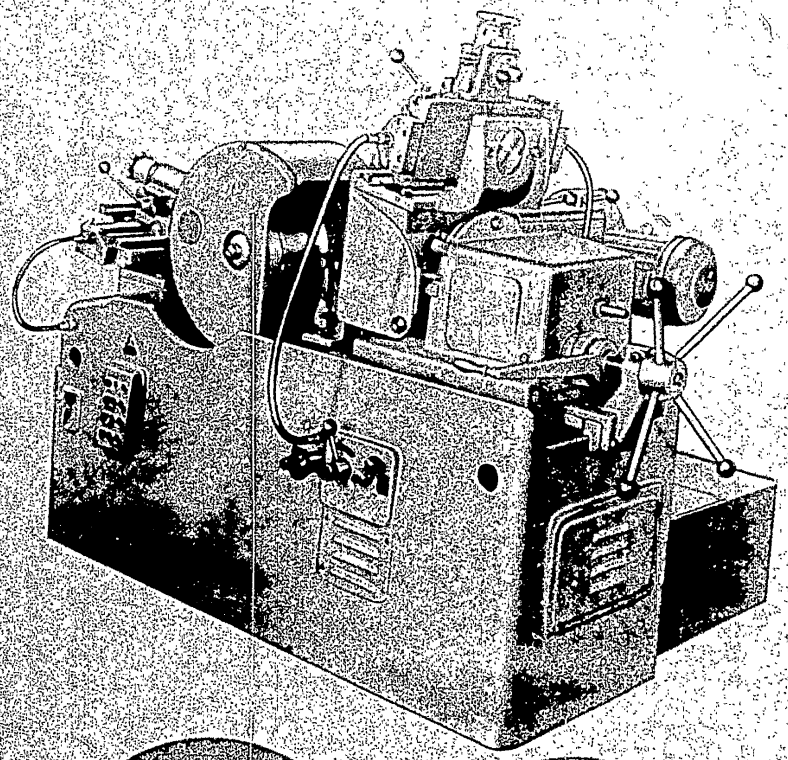

4B

Type 4B CENTRELESS GRINDING MACHINE

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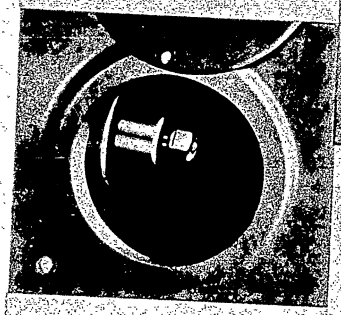
CENTRELESS GRINDING MACHINE Type 4B

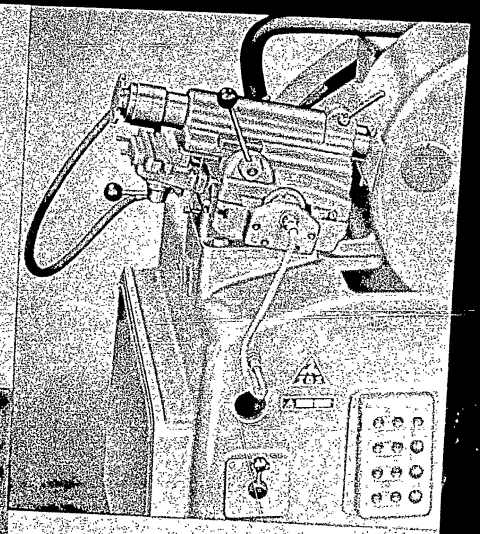
The machine is intended for centreless through-feed grinding of cylindrical parts and infeed grinding of parts with shoulders and parts of special shapes.

The grinding wheelhead is fixed and provided with a hydraulic truing device and a wheel guard. The regulating wheelhead with the wheel guard swivels around a horizontal axis. The regulating wheel is driven through the gear box. The speeds of the regulating wheel are changed by means of change gears and the back gear lever. The approach of the regulating wheelhead is adjusted by means of a hand wheel, the feed during infeed grinding being operated by a lever. The regulating wheel truing device is also hydraulically operated. The grinding wheelhead, regulating wheelhead, hydraulic oil pump, lubricating oil pump and coolant pump are driven by independent electric motors remote controlled by means of push-buttons.

STANDARD EQUIPMENT

Grinding wheel, 500×100×305 mm.
Regulating wheel, 300×100×
×127 mm.
Clamping flange of grinding wheel.
2 clamping flanges of regulating wheel.
Balancing arbour of grinding wheel.
Equipment for balancing of grinding wheel during operation of machine.
Change pulley for worn wheel.
Set of change gears with side table.
Template holders for form truing.
Workrest for through-feed grinding (only for wheels 100 mm wide).

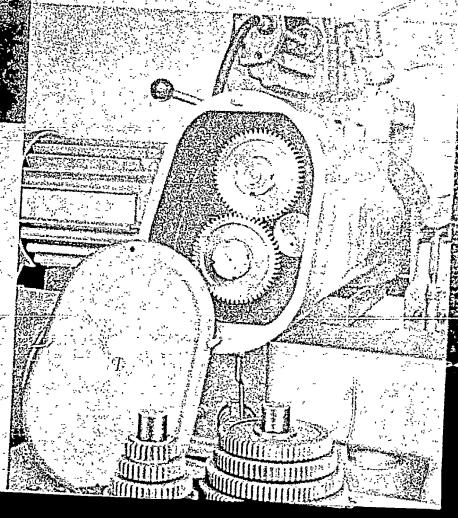




Set of workrest blades and guides for through-feed grinding.
Workrest for infeed grinding with ejector (for wheels up to a width of 160 mm).
Set of exchangeable workrest blades for infeed grinding.
Complete cooling equipment.
Set of spanners.
Grease gun.
Oil can.
Operating instructions.

OPTIONAL EQUIPMENT

Grinding wheel balancing stand.
Spot light.



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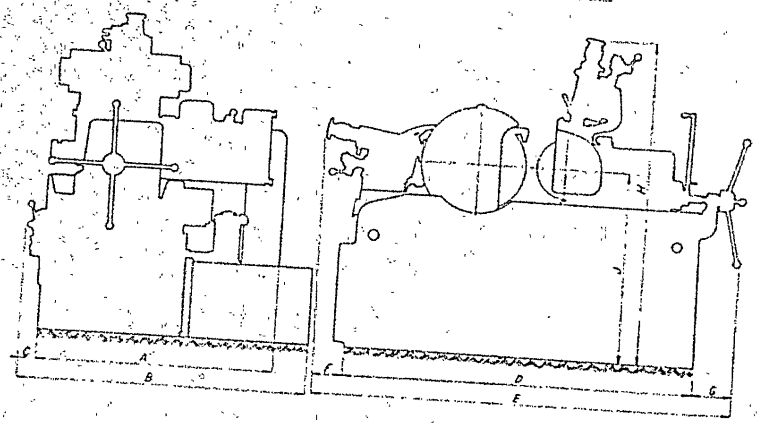
Specification

Maximum grinding diameter	100 mm	30
Minimum grinding diameter	4 mm	5/32"
Length of workpiece for through-feed grinding	300 mm	77
Length of workpiece for infeed grinding with maximum width of wheel	150 mm	57
Grinding wheel (diameter × bore)	500 × 305 mm	19
Diameter of worn grinding wheel	370 mm	14
Width of grinding wheel (maximum/minimum)	150/100 mm	57
Regulating wheel (diameter × bore)	300 × 127 mm	11
Diameter of worn regulating wheel	200 mm	77
Width of regulating wheel (maximum/minimum)	150/100 mm	57
Floor space required by machine	1530 × 2200 mm	57
Weight of machine with standard equipment approx.	3760 kg	8260 lbs

Operating Data:

Speeds of grinding wheel	1320, 1500 r. p. m.
Speeds of regulating wheel	15, 20, 24, 27, 30, 35, 40, 45, 48, 55, 58, 70, 72, 85, 90, 100, 116, 140, 170, 200, 264 r. p. m.
Truing speed of regulating wheel	405 r. p. m.
Swivel of regulating wheelhead	8°
Swivel of diamond holder of regulating wheel truing device	8°
Movement of diamond of regulating wheel truing device from centre-line of diamond holder	30 mm
Movement of diamond holders of wheel truing devices	230 mm
Movement of regulating wheelhead	262 mm
Total output of electric motors	18,6 kW

A	B	C	D	E	F	G	H	J
1270 mm / 50"	1550 mm / 61"	200 mm / 7.9"	1850 mm / 73"	2200 mm / 87"	165 mm / 6.5"	185 mm / 7.3"	1680 mm / 66.5"	1000 mm / 39.3"



Please state in your order the voltage available for electric motors.

The particulars given in this prospectus are not binding.

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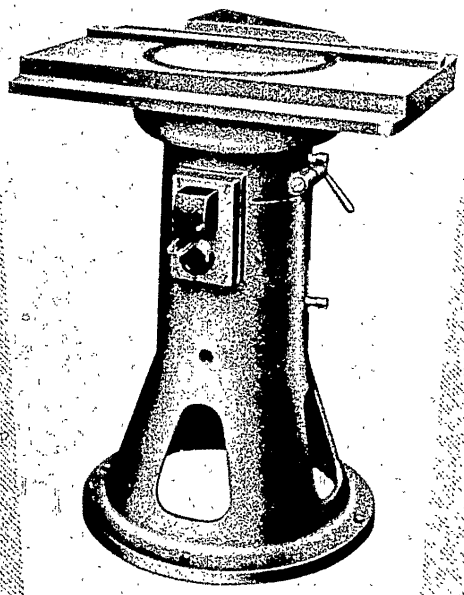
TABLE TYPE SURFACE GRINDER Model

BM 600



The machine is intended for hand grinding of plane surfaces in single piece manufacture and multiple production and on erection jobs. The parts are ground dry and without clamping.

THE GRINDING WHEEL is of the pot type and is fixed directly to the shaft of the electric motor which is mounted on the housing of the machine and provided with a feeding assembly for vertical adjustment controlled by a hand wheel. It is locked in position by clamping in the centre part of the housing by means of a screw and handle. The grinding wheel can be accurately balanced by balancing weights. The machine is provided with a dust extraction branch which can be connected to the central dust extraction equipment or may, on request, be equipped with its own dust extraction equipment with an electric motor.

THE WORKING SURFACE OF THE TABLE is provided with a bar against which the workpiece rests. The stepped part of the table permits also shoulder work to be ground.

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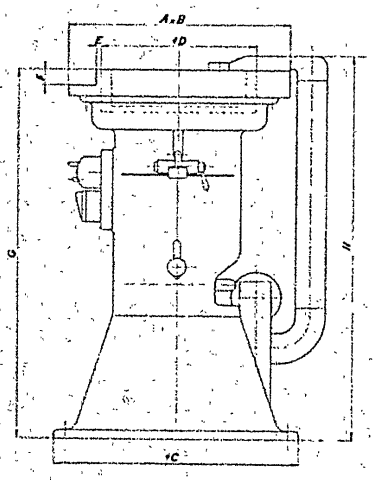
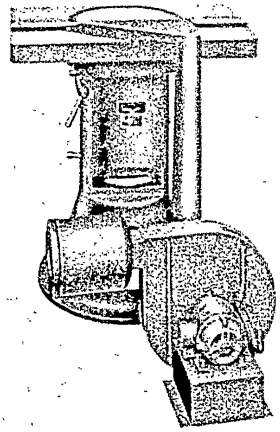
TABLE TYPE SURFACE GRINDER Model BM 600

STANDARD EQUIPMENT. Electric motor for drive of grinding wheel, pot shaped grinding wheel, electric motor switch, set of spanners, operating instructions.

OPTIONAL EQUIPMENT. Dust extraction equipment with electric motor, filter and plug.





A	B	C	D	E	F	G	H
550 21.5"	800 31.4"	600 23.6"	400 15.7"	10 0.4"	40 1.67"	900 35.5"	940 37"

SPECIFICATION

Dimensions of table	mm	550×800	21⅝"×31½"
Distance, working surface of table to floor	mm	900	35½"
DIMENSIONS OF GRINDING WHEEL:			
outside diameter	mm	400	15¾"
inside diameter	mm	350	13¾"
height	mm	100	3¹⁵⁄₁₆"
Vertical movement of grinding wheel	mm	70	2¾"
Speed of grinding wheel motor	r. p. m.	1420	
Output of motor	kW	2.2	
Floor space required by machine	mm	550×800	21⅝"×32"
WEIGHT OF MACHINE WITH STANDARD EQUIPMENT:			
net	kg	270	595 lbs
shipping, railway packing	kg	300	660 lbs
shipping, seaworthy packing	kg	340	750 lbs
Volume of packing case	cu. metres	0.86	30 cu. ft.
Dimensions of packing case	mm	1050×750×1100	42"×30"×44"

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS.

The data given in the prospectus are not binding in detail.

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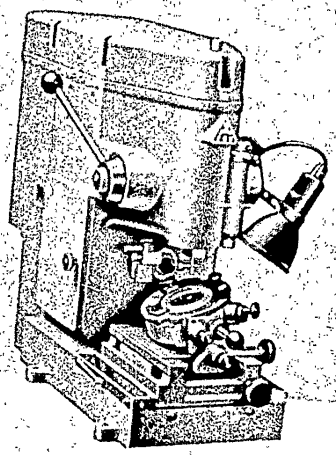

THREADING DIE GRINDER

Model

DNO

This Heavy Duty Precision Machine is intended for the grinding of all types of thread cutting dies, to prolong their life and increase their utilisation.

THE WHEEL SPINDLE rotates in three pairs of angular-contact ball bearings and is driven by an endless woven texrope from the countershaft. The spindle speed is approx. 24.000 r. p. m. The grinding wheels are employed in a size to suit the dimensions of the dies to be ground and are clamped in the spindle by means of a collet.

THE DIE-HOLDER is brought into its working position by the longitudinal and cross feed. The dies are clamped in the die-holder head directly or by using inserts. The head swivels ± 20 deg. according to a scale.

THE WHEEL TRUEING DEVICE is provided for dressing or tapering the wheel by means of the diamond.

THE DUST EXHAUST ATTACHMENT is arranged for exhausting the dust from the die-holder head or from the trueing device. The dust is collected in the dust separator from where it is removed after a certain time.

THE DRIVE is by a self-contained electric motor. The power is transmitted by 2 V-belts through the countershaft which is coupled to the dust exhaust attachment. The motor switch is located on the right-hand side of the machine.

THE BULB on a slewing arm gives sufficient light in all directions.

STANDARD EQUIPMENT: Electric motor with switch and fuses, trueing device (less diamond), dust exhaust attachment, 3 grinding wheels dia. 3, 6 and 8 mm, spot light, set of spanners, operator's instruction booklet.

TOS

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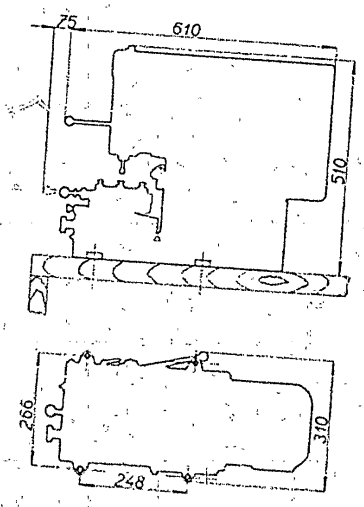
Specifications

			Metric	English
Maximum dimensions of the die:	External dia	mm	75	2.95"
	Metric thread		M 42	
	Whitworth thread		—	1 5/8"
Spindle speeds		r. p. m.	24000	24000
Stroke of spindle		mm	60	2.36"
Cross-longitudinal feed of die-holder		mm	32/50	1.26"/2"
Number of graduations on the die-holder			3, 4, 5, 6	3, 4, 5, 6
Die-holder swivels up to			± 20	± 20 deg.
Trueing device swivels up to			0°, 30°, 45°	0, 30 45 deg
Diameter of diamond-holder		mm	6	0.236"
Motor: Output		HP	0,75	0 75
Speed		r. p. m.	2770	2770
Speed of dust exhaust fan		r. p. m.	5000	5000
Overall height of machine		mm	510	20"
Floor space required		mm	310 × 610	12.2" × 24"
Weight of machine		kg	65	144 lbs.
Weight of machine with packing		kg	85	188 lbs.
Contents boxed		m³	0.20	7 cu. ft.



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TOS DRILL GRINDER

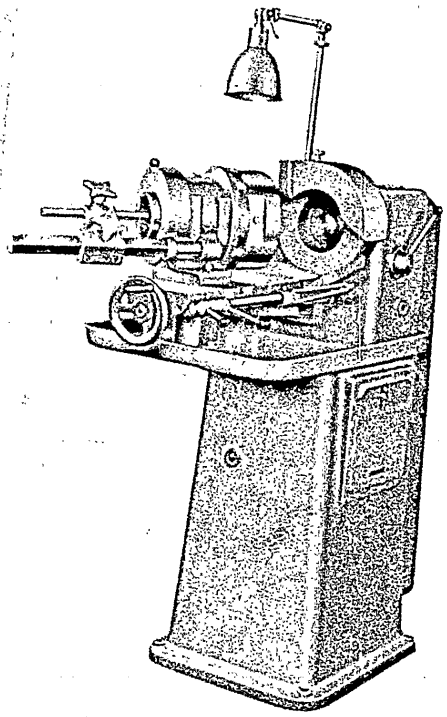
MODEL BNV 75

GENERAL DESCRIPTION

The wheel head is driven by a belt directly from the motor. The spindle is eccentrically supported in a quill so that the grinding wheel performs a planetary motion. In addition the quill is provided with an axial cam which causes an oscillating motion of the spindle, so that the grinding wheel performs three motions simultaneously. By this combined motion conditions are produced for generating a proper drill point and clearance.

A single belt drive to wheel head and gear box is provided. The gear box serves for producing the rotary and axial motion of the wheel spindle quill and for driving the chuck. The oscillating motion of the spindle can be stopped while running by a lever controlling a special clutch which always stops the oscillating motion of the spindle in the same starting position thus making possible the changing and clamping of the drill.

The two-jaws drill chuck is driven from the gear box by a telescope shaft and is bolted to the carriage which enables its approaching to the grinding wheel. The wheel truing device as well as the adjustable gib are mounted on the chuck carriage. The lubrication of the spindle quill is by a gear pump housed in the gear box. The gear box mechanism runs in an oil bath. The other parts, as well as the spindle are lubricated by hand. The electrically driven coolant pump is situated at the side of the machine. The coolant tank is incorporated inside the base. The electrical equipment consists of the main drive and coolant pump motors. These are started directly by switches provided on a built-in panel which is equipped with a transformer and a spot light switch for 24 volts.



THIS FAST OPERATING PRECISION MACHINE TOOL HAS BEEN DESIGNED EXCLUSIVELY FOR THE GRINDING OF TWO-LIP TWIST DRILLS. THE DRILLS ARE HELD BETWEEN TWO SELF-CENTERING CHUCK JAWS REVOLVING CONTINUOUSLY WHILE GRINDING. THE SPECIAL DRILL POINT GROUND ON THIS MACHINE PERMITS THE DRILLING WITH LESS FEEDING PRESSURE AND LESS POWER AS COMPARED WITH DRILLS GROUND ON OTHER MACHINES.

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SPECIFICATIONS

	Metric	English
Drill size capacity: minimum dia	6	¼
maximum dia	75	3
Minimum angle of cutting lips	60°	60°
Maximum angle of cutting lips	160	160
Grinding wheel: outer dia	225	8.9"
hole, dia	124	4.85
width	50	2"
Travel of carriage	60	3"
Speed of grinding wheel	2200 R P M	2200 R P M
Speed of chuck	34 R P M	34 R P M
Main motor: Speed	1400 R P M	1400 R P M
Output	1.5 kW	1.5 kW
Pump motor: Speed	2800 R P M	2800 R P M
Output	0.15 kW	0.15 kW
Hydraulic pump capacity	10 litres p. min	2.2 gal
Floor space required	1240 × 660 mm	49" × 26"
Weight of machine: with standard equipment	500 kg	1100 lbs
with packing	550 kg	1210 lbs
with seaworthy packing	700 kg	1540 lbs
Dimensions of box	1500 × 1450 × 1150 mm	59" × 57" × 39"

WHEN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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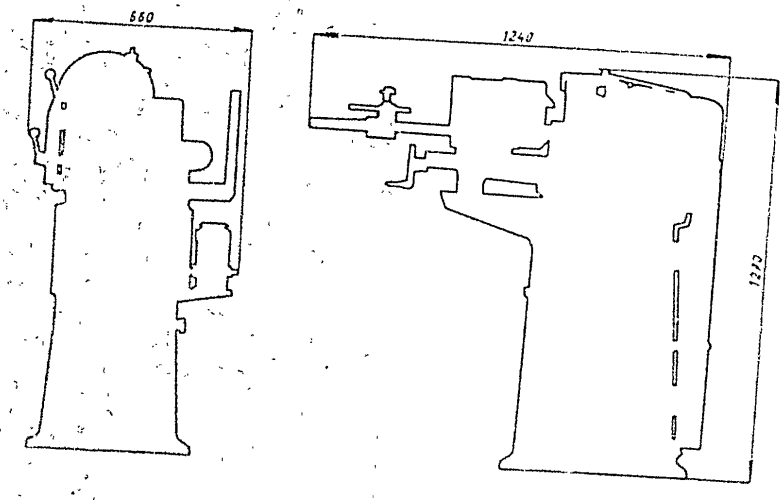

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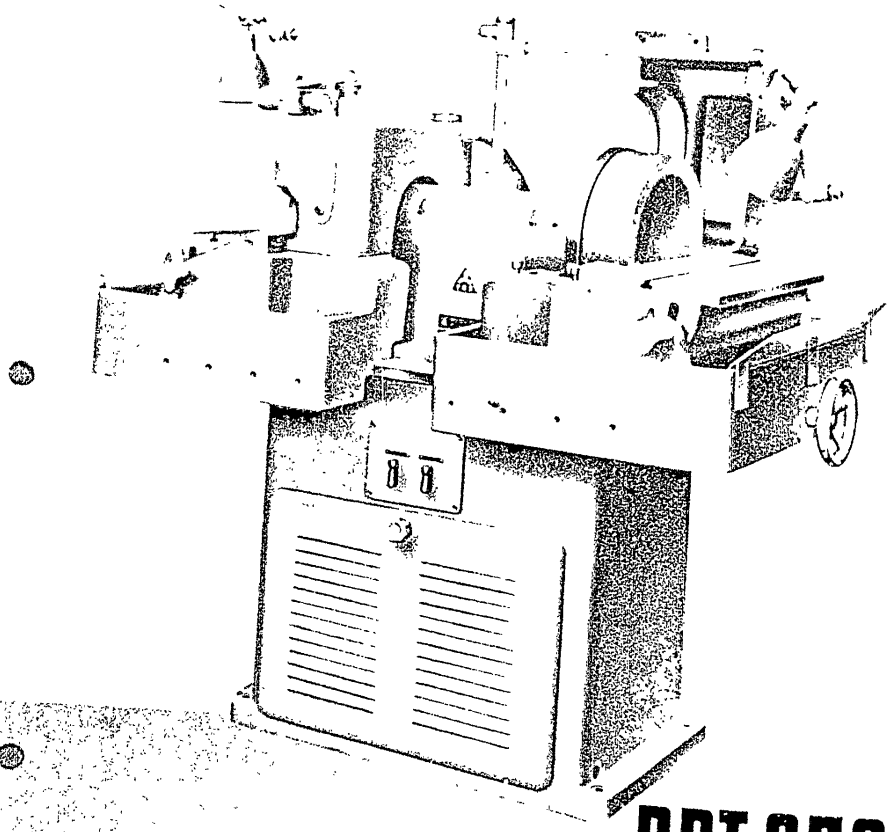

DUPLEX-WHEEL TOOL GRINDER MODEL

BBT 350

This machine is especially effective for the sharpening of carbide-tipped tools. The sharpening operation is performed by the face of the straight cup wheel while the tool rests on an angularly adjustable tilting table.

THE SPINDLE rotates in precision anti-friction bearings and is driven by two V belts from the electric motor located inside the column which also contains the coolant tank

THE TABLES may be angularly adjusted ± 20° C and moved by a handwheel in the direction of the centerline of spindle. Graduations in degrees indicate the angular setting of the work tables.

THE WHEEL TRUEING DEVICES are mounted on the wheel guards. They may be swung down and are finely adjustable by a screw

STANDARD EQUIPMENT, electric motor with electrical equipment 2 grinding wheels, 2 wheel trueing devices, 2 spare wheel flanges, coolant pump, operating instruction booklet

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		Metric	English
Dimensions of grinding wheels			
external diameter	mm	350	13¾"
internal diameter	mm	270	10⅝"
width	mm	100 or 70	4 or 2¾"
Speed of grinding wheel	R. p. M.	1560	1560
Dimensions of table	mm	210 × 560	8¼" × 22"
Table travel by hand	mm	95	3¾"
Maximum angular setting of tilting tables		± 20°	± 20°
Electric motor: Speed	R. p. M.	1420	1420
Output	HP	2	2
Floor space required	mm	860 1420	34" × 56"
Weight of machine: with standard equipment	kg	820	1800 lbs.
with packing	kg	840	1860 lbs.
with seaworthy packing	kg	960	2120 lbs
Contents boxed	m^3	2,25	80 cu ft.
Size of case	cm 100	150×150	39" × 59"×59"

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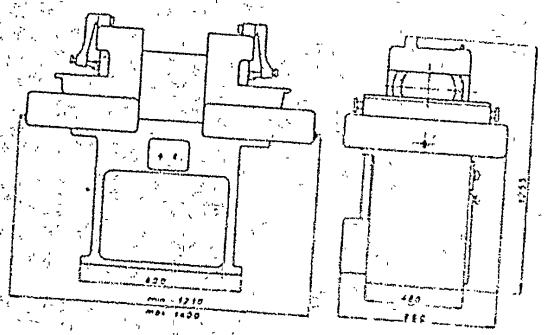

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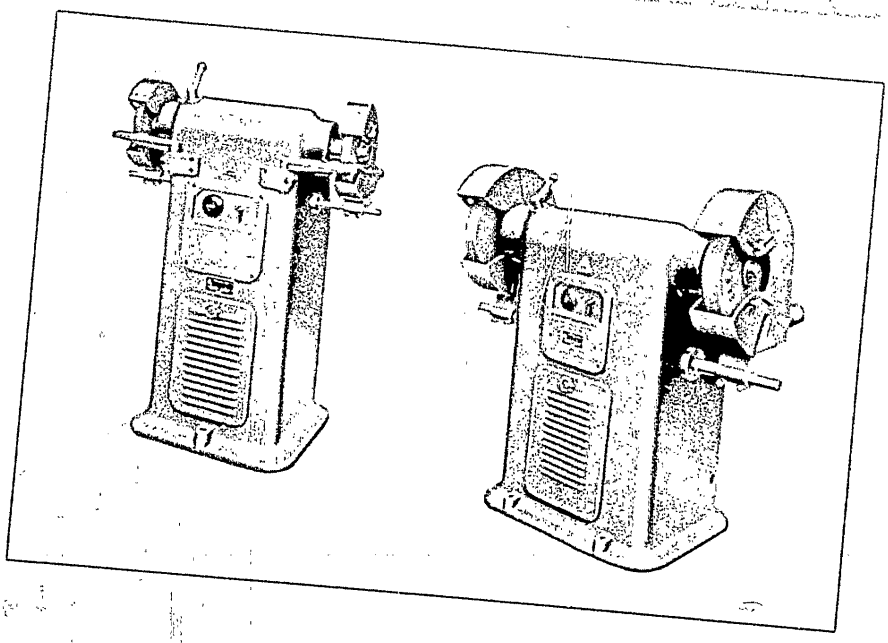

DUPLEX-WHEEL GRINDERS BL3-BL4

These machines are adapted for the grinding of seams, castings and forgings, and for the sharpening of cutting tools, chisels, etc. They can also be employed as polishing machines.

THE SPINDLE rotates in special ball bearings. The power is transmitted by V-belts from the electric motor located on a hinged plate inside the column. Both spindle ends are equipped with metric tapers for clamping the spindle extensions with the grinding wheels. The bearings are protected by labyrinth packings against the entrance of dust and dirt.

A powerful braking mechanism ensures instantaneous stopping of spindle. The grinding wheels are covered by hinged protective hoods.

The machines are made in two sizes:

with grinding wheels up to dia. 225 mm for light work,
up to dia. 350 mm for heavy duty.

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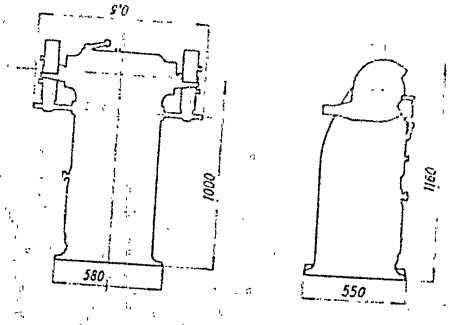
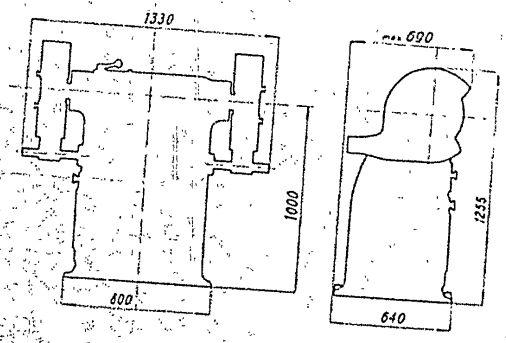


BL 3 Duplex-Wheel Grinder



BL 4 Duplex-Wheel Grinder

		Metric		English	
		BL 3	BL 4	BL 3	BL 4
Dimensions of grinding wheel: diameter	mm	225	350	8¾"	13¾"
width	mm	25	60	1"	2⅜"
bore	mm	25	33	1"	1⅜"
Taper in spindle	metric	32	40	32	40
Diameter of grinding wheel flanges	mm	60	80	2⅜"	3⅛"
Distance between grinding wheels	mm	740	1030	29"	40½"
Spindle speeds: for grinding	r. p. m.	2800	2710	2800	2710
for polishing	r. p. m.	4100	4370	4100	4370
Main drive motor: speed	r. p. m.	2800	2800	2800	2800
output	HP	3	4,5	3	4,5
Floor space required	mm	550×950	700×1350	21½"×37½"	27½"×53"
Weight of machine with standard equipment	kg	360	500	800 lbs	1100 lbs
Contents boxed	m³	1	1,7	35 cu. ft.	60 cu. ft.

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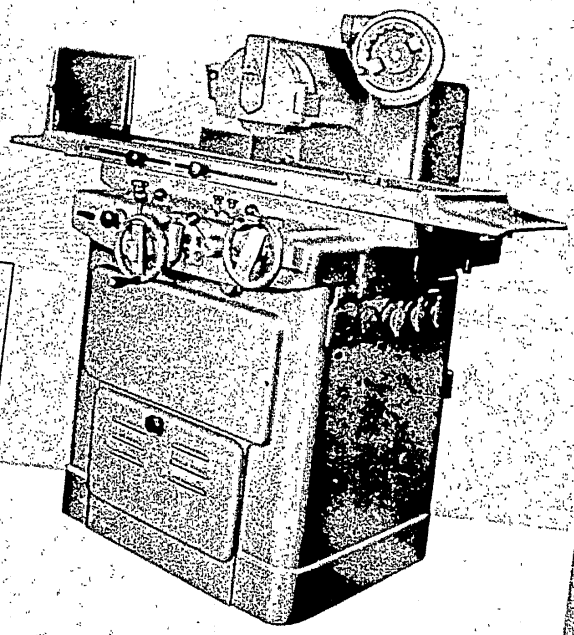
HORIZONTAL SURFACE GRINDER

Model

BPH20



Horizontal Surface Grinder Model BPH 20 with automatic, hydraulically controlled working cycle is designed for precision grinding of plane even longitudinally stepped surfaces and is equally well-suited for large and small shops both with series and single part production.

THE WHEEL SPINDLE is mounted horizontally in adjustable bearings and can be vertically adjusted either by power or micrometrically by hand. Automatic lubrication is provided.

THE TABLE. The table movement is hydraulic infinitely variable or by hand. The cross slide motion is effected hydraulically from 0.1 mm to 6 mm in one or in both table reversals. The micrometer feed of the cross slide is manual by a micrometer screw. The grinding width is easily adjustable by stops provided for changing the feed direction by means of a lever. An outstanding feature of this machine is the adjustable working cycle enabling the hydraulic and automatic control of cross slide feed and of vertical feed into the cut. The rate of the vertical feed is adjustable from 0 to 0.05 mm.

THE BED is provided with Vee and flat guides for the table cross feed and with rear slideways for vertical adjustment of the wheel slide. The bed also embodies the tank for the hydraulic system.

THE ELECTRICAL EQUIPMENT consists of electric motors and protective contactors with remote pushbutton control.

STANDARD EQUIPMENT: Grinding wheel with balancing flange, wheel spindle motor, oil pump motor, motor for vertical adjustment of wheelhead, pushbutton system with protective contactors, micrometer cross feed, demagnetising switch for the electromagnetic chuck, wheel trueing device attached to the wheelhead, set of spanners, operator's instruction booklet.

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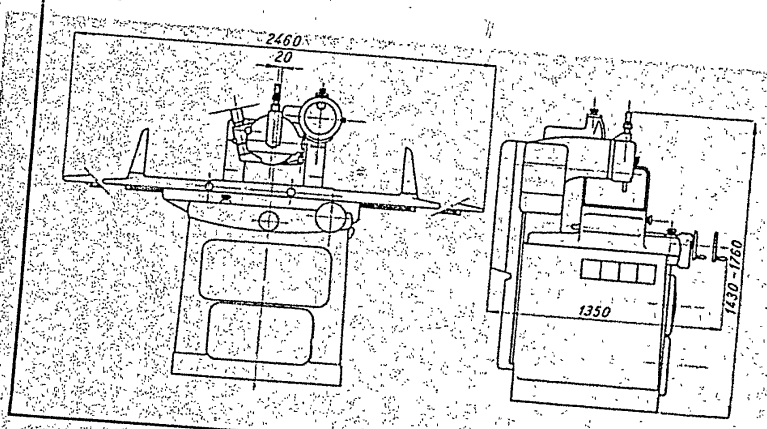
OPTIONAL EQUIPMENT: Dust exhaust attachment, cooling attachment, electromagnetic chuck, rectifier, for the electromagnetic chuck, wheel balancing stand, wheel dresser attached to the table (without diamond), spare grinding wheel flange, longitudinal stop, radius trueing device

SPECIFICATIONS:

		Metric	English
Working surface of table	mm	200 × 630	7 7/8" × 24 3/4"
Dimensions of grinding wheel: external diameter	mm	250	9 7/8"
internal diameter	mm	76	3"
width	mm	18	11/16"
Minimum diameter of grinding wheel	mm	130	5 1/8"
Longitudinal travel of table	mm	690	27 1/8"
Cross travel of table	mm	230	9"
Vertical travel of wheelhead	mm	350	13 3/4"
Speed of longitudinal table travel	m/min	1—18	in mm 39—710
Cross feed of table, ranging from	mm	0.1—6	0.004"—0.23"
Vertical feed adjustment into the cut by hand per 1 division on the dial	mm	0.0—0.01	0.0—0.0004"
hydraulic	mm	0.0—0.05	0.0—0.002"
Motor for wheel spindle drive: Speed	R. p. M	2800	2800
Output	H. P.	1.9	1.9
Motor for vertical travel of wheelhead: Speed	R. P. M	2770	2770
Output	H. P.	0.7	0.7
Motor for oil pump drive: Speed	R. P. M	1400	1400
Output	H. P.	2	2
Floor space required	mm	1350 × 2460	53" × 97"
Weight of machine: with standard equipment	kg	1380	3050 lbs
with packing	kg	1480	3260 lbs
with seaworthy packing	kg	1660	3670 lbs
Contents boxed	m³	4	140 cu. ft.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.



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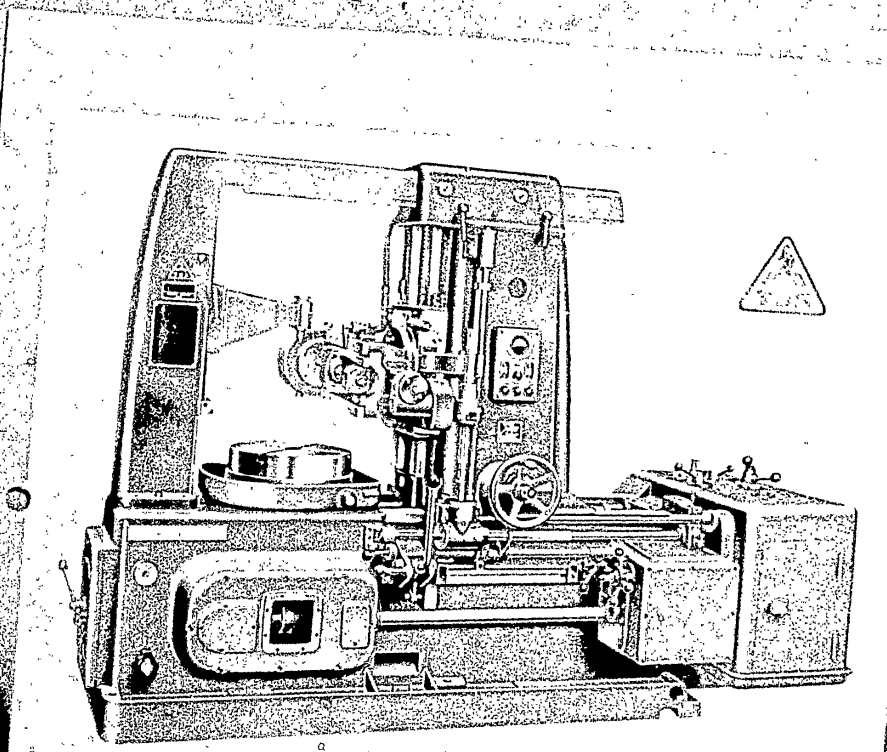

GEAR HOBBING MACHINE

This is a Heavy Duty Machine for the intensive production of precision spur, helical and worm gears by the conventional hobbing method. Worm wheels can also be cut by the tangential method. The wide speed and feed range permits to cut all commonly used kinds of material.

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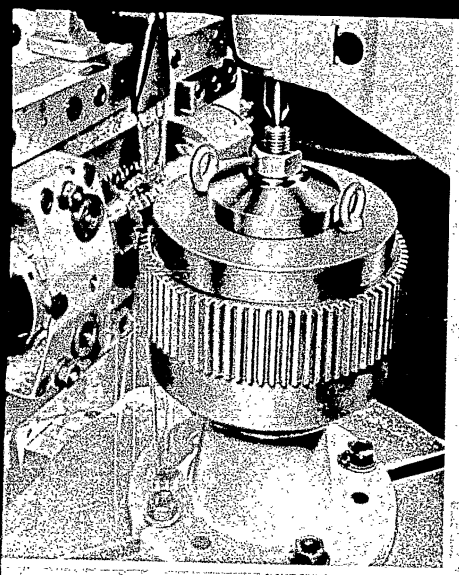

GEAR HOBBING MACHINE FO 6

THE DRIVE is from the main drive motor through the gear box to the work-spindle driving mechanism and to the index worm gearing for setting the number of teeth of the gear to be cut, whence the power is transmitted to the hob-slide feeding mechanism and to the work table. For cutting helical gears a differential gearing with change gears for setting the helix angle is interposed in the driving mechanism.

The machine is started and stopped from the operating position by push-buttons provided for the remote control of the protective contactors.

LUBRICATION

The oil is delivered to all important points automatically.

COOLING

A motor driven electric pump supplies the coolant from a tank inside the bed.

STANDARD EQUIPMENT

2 electric motors for 380 or 220 volts, including electrical equipment, cooling attachment with electric pump, 3 hob arbours dia. 22, 27 and 32 mm, 1 work arbour with differential nut and plate, hob setting gauge, work arbour support with bearing, 1 set of index change gears, 1 set of differential change gears, 1 set of service spanners, operating plates and tables, operating instructions.

OPTIONAL EQUIPMENT

attachment for cutting worm gears with the tangential method, auxiliary table dia. 670 mm, 6 cast iron plates for clamping the gears on the auxiliary table dia. 670 mm, auxiliary table dia. 850 mm, 6 cast iron plates for clamping the gears on the auxiliary table dia. 850 mm.

THE HOB SLIDE

with the accurately mounted work spindle is swivelled and vertically adjusted on the flat guideways of the stanchion. It is carefully balanced by a counterweight. The hob-slide and stanchion feeds are automatically disengaged by adjustable stops. Power rapid traverse is provided for moving the hob slide rapidly in either direction. To secure a correct alignment between the hob and the work table the machine is fitted with a hob setting gauge which is supplied as standard equipment.

THE WORK TABLE

is driven by a new, special worm and gear, designated „Dual Lead Worm Gearing" permitting to eliminate backlash and to obtain a correct, full tooth contact. The table mounting is also adjustable.

STANCHION

The stanchion with the hob slide is mounted on the bed and may be rapidly moved in any predetermined position. It is connected with the work support by an overarm, thus forming together with the bed unit a compact frame to ensure rigidity and quiet and accurate cutting operation even at peak output. The motion of the stanchion and hob slide is easily read on a scale with vernier.

IN ORDERING, SPECIFY VOLTAGE PHASE AND FREQUENCY OF POWER SUPPLY!

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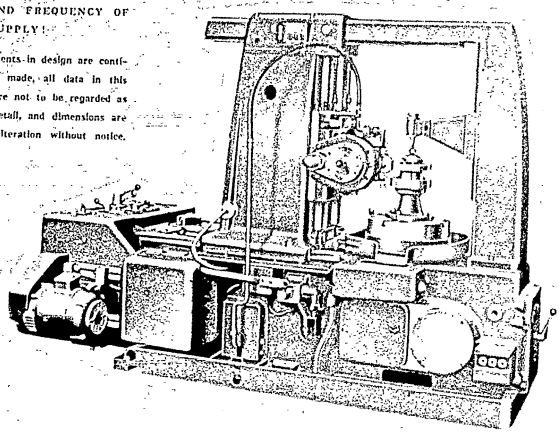

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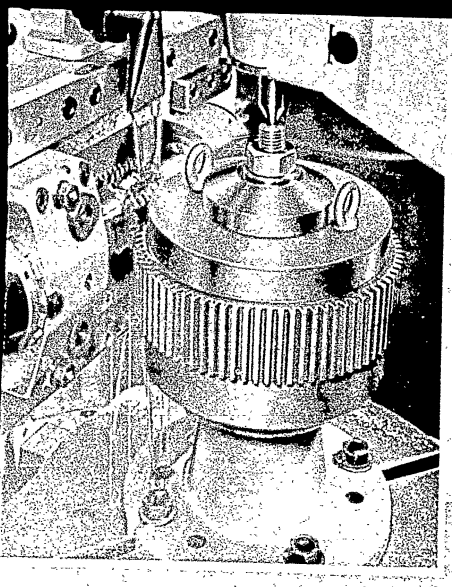

GEAR HOBBING MACHINE FC 6

THE DRIVE is from the main drive motor through the gear box to the work-spindle driving mechanism and to the index worm gearing for setting the number of teeth of the gear to be cut, whence the power is transmitted to the hob-slide feeding mechanism and to the work table. For cutting helical gears a differential gearing with change gears for setting the helix angle is interposed in the driving mechanism. The machine is started and stopped from the operating position by push-buttons provided for the remote control of the protective contactors.

LUBRICATION

The oil is delivered to all important points automatically.

COOLING

A motor driven electric pump supplies the coolant from a tank inside the bed.

STANDARD EQUIPMENT

2 electric motors for 380 or 220 volts, including electrical equipment, cooling attachment with electric pump, 3 hob arbours dia. 22, 27 and 32 mm, 1 work arbour with differential nut and plate, hob setting gauge, work arbour support with bearing, 1 set of index change gears, 1 set of differential change gears, 1 set of service spanners, operating plates and tables, operating instructions.

OPTIONAL EQUIPMENT

attachment for cutting worm gears with the tangential method, auxiliary table dia. 670 mm, 6 cast iron plates for clamping the gears on the auxiliary table dia. 670 mm, auxiliary table dia. 650 mm, 8 cast iron plates for clamping the gears on the auxiliary table dia. 650 mm.

THE HOB SLIDE

with the accurately mounted work spindle is swivelled and vertically adjusted on the flat guideways of the stanchion. It is carefully balanced by a counterweight. The hob-slide and stanchion feeds are automatically disengaged by adjustable stops. Power rapid traverse is provided for moving the hob slide rapidly in either direction. To secure a correct alignment between the hob and the work table the machine is fitted with a hob setting gauge which is supplied as standard equipment.

THE WORK TABLE

is driven by a new, special worm and gear, designated „Dual Lead Worm Gearing" permitting to eliminate backlash and to obtain a correct, full tooth contact. The table mounting is also adjustable.

STANCHION

The stanchion with the hob slide is mounted on the bed and may be rapidly moved in any predetermined position. It is connected with the work support by an overarm, thus forming together with the bed unit a compact frame to ensure rigidity and quiet and accurate cutting operation even at peak output. The motion of the stanchion and hob slide is easily read on a scale with vernier.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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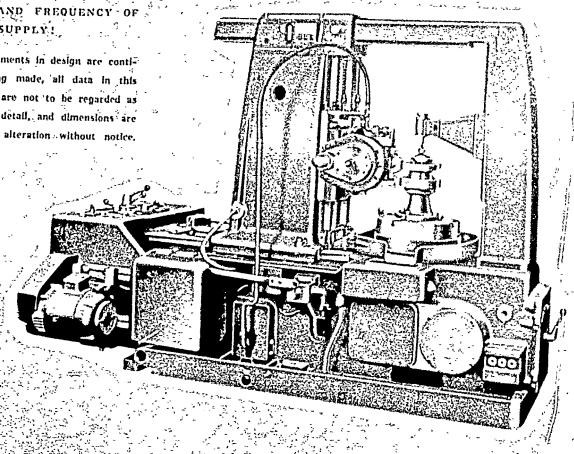

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F 6 SPECIFICATIONS

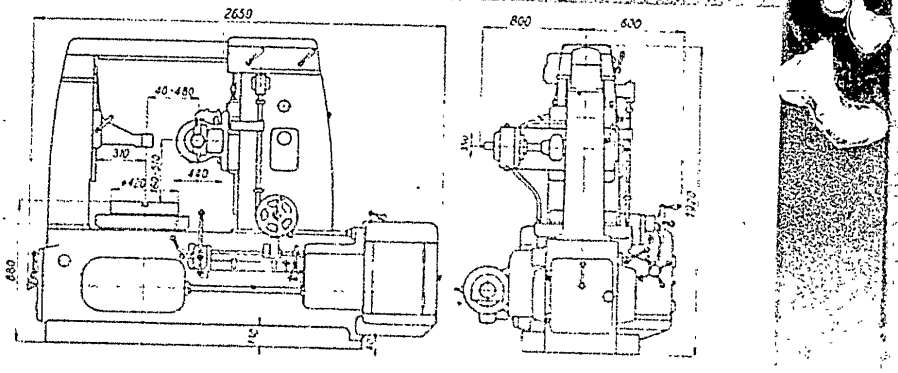
		Metric	English
Maximum module of gears		6	6
Maximum diameter of gears	mm	800	31½"
Maximum diameter of gears (with support)	mm	600	23½"
Face capacity of spur gears: for gears dia. 820 mm	mm	280	11 "
for gears dia. 75 mm	mm	200	7⅞"
Face capacity and diameter of helical gears:			
helix angle approx. 15°: face of gear	mm	250	9⅞"
diameter of gear	mm	820	32¼"
helix angle approx. 30°: face of gear	mm	210	8¼"
diameter of gear	mm	800	31½"
helix angle approx. 45°: face of gear	mm	190	7½"
diameter of gear	mm	680	26¾"
helix angle approx. 60°: face of gear	mm	90	3½"
diameter of gear	mm	600	23½"
Centre-line distance, table-to work spindle: Maximum	mm	480	18⅞"
Minimum	mm	10	⅜"
Minimum distance, centre line of work spindle to working surface of table	mm	160	6¼"
Vertical travel of hob slide	mm	330	13"
Maximum diameter of hob	mm	120	4¾"
Maximum length of hob	mm	130	5⅛"
Diameter of work table	mm	420	16½"
Bore of work table	mm	75	2,95"
Depth of work-table bore	mm	550	21½"
Diameter of index worm gear	mm	450	17¾"
Diameter of work arbour	mm	30	
Diameters of hob arbours	mm	22, 27, 32	
Work spindle speeds: Number		12	12
Range	R. p. M.	15—190	15—190
Feeds: Number		9	9
Range of vertical hob-slide feeds per 1 table revolution	mm	0.33-5.2 cuts per inch 4.9-77	
Range of longitudinal hob-slide feeds per 1 table revolution	mm	0.1-1.5 cuts per inch 17-251	
Main drive motor: Speed	R. p. M.	1500/3000	1500/3000
Power	HP	4/5	4/5
Power rapid traverse motor: Speed	R. p. M.	1500	1500
Power	HP	1	1
Floor space required	mm	2540 × 1110	100" × 55"

Weight of machine: with standard equipment kg 1000, lbs 8800, crated kg 4250, lbs 9400, boxed for export kg 4750, lbs 10500, contents boxed m³ 10, cu. ft. 353.

Attachment for cutting worm gears by the tangential method:

Vertical travel of work spindle	mm	210	8¼"
Maximum diameter of worm gear at maximum module = 5	mm	360	14⅛"
Feeds: Number		9	9
Feed range per 1 table revolution	mm	0.15-2.15 cuts per inch 10-170	
Weight of tangential attachment	kg	80	lbs 220

The machine has been designed and built for generating gears up to the module 6, but its capacity permits to cut gears up to the module 8 under the same cutting conditions as for the module 6.



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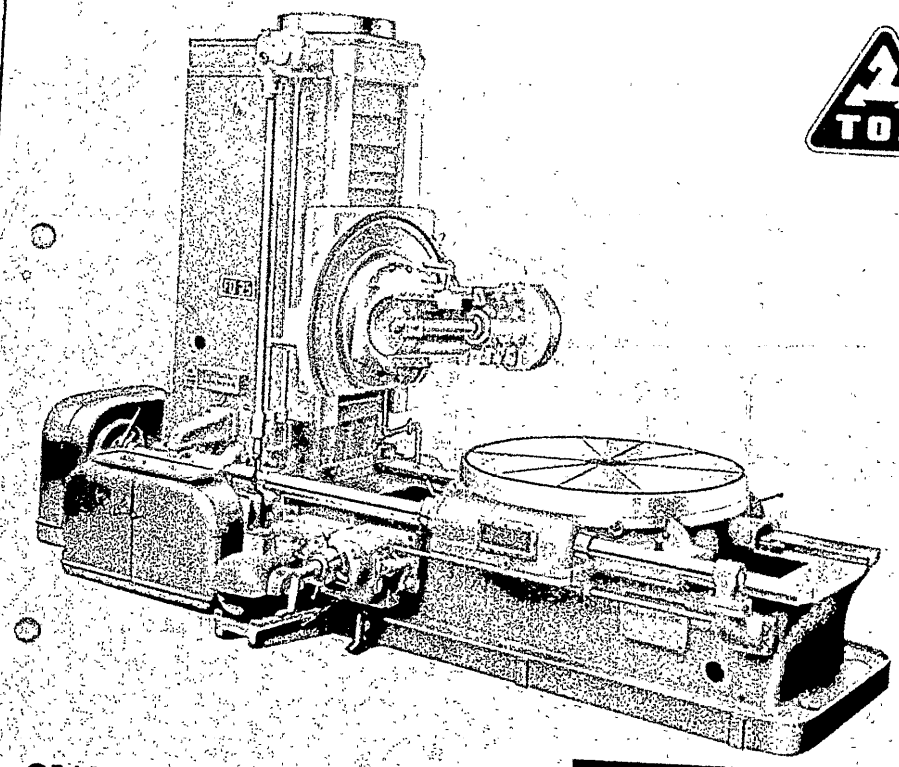

TOS

GEAR HOBBING MACHINE Model

FH 25

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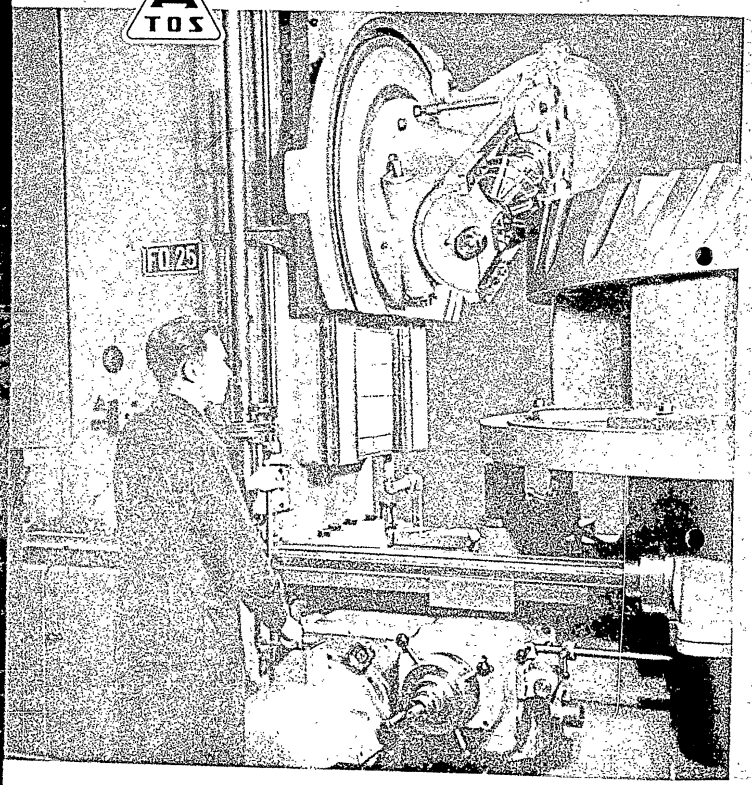

This Heavy Duty Gear Hobbing Machine is intended for the intensive production of precision spur, helical and worm gears by the conventional hobbing method. Worm wheels can also be cut by the tangential method. The wide speed and feed range enables the cutting of all commonly used kinds of material.

THE DRIVE is by belts from the main drive motor through the gearbox to the hob spindle mechanism and to the index worm gears for setting the number of teeth of the gear to be cut, whence the power is transmitted to the hob slide feeding mechanism and to the work table. For cutting helical gears a differential gearing with change gears for setting the helix angle is interposed in the driving mechanism. The tables for setting these change gears are to be found in the operator's instruction booklet. The machine is started and stopped from the operating position by pushbuttons for the remote control of the protective contactors.

THE HOB SLIDE with the accurately mounted hob-spindle may be swivelled and vertically adjusted on the prismatic and ground guideways of the stanchion. The hob slide and the work table feeds are automatically disengaged by adjustable stops. Power rapid traverse is provided for rapidly moving the hob slide and the work table to the required position. To ensure correct alignment between the hob and the work table the machine is fitted with a hob setting gauge which is supplied as standard equipment.

THE WORK TABLE is driven by a new, special worm and gear, designated „Dual Lead Worm Gearing" permitting to eliminate backlash and to obtain a correct, full tooth contact. The table can be relieved by a hydraulic equipment with adjustable pressure to suit the weight of the gear being hobbed. The position of the work table and hob slide is easily checked on scales with vernier.

THE STANCHION with flat and ground guideways is fixedly attached to the bed unit and its rigid construction ensures a quiet and accurate cutting operation even at peak output.

LUBRICATION. The oil is delivered to all important points by an automatic lubrication system.

COOLING. A motor-driven electric pump supplies the coolant from a tank located inside the bed.

STANDARD EQUIPMENT:

2 electric motors to suit 380 or 220 volts including electrical equipment, cooling system with electric pump, hydraulic equipment with electric motor for relieving the work table, 1 hob arbors dia. 40 °6, 50 and 60 mm, 1 work arbor with differential nut and plate, hob setting gauge, set of index change gears, set of differential change gears, set of speed change gears, set of feed change gears, set of spanners, operator's instruction booklet, operating plates and tables.

OPTIONAL EQUIPMENT:

Attachment for cutting worm gears by the tangential method, attachment for cutting by the individual indexing method, cutter head for end mill, cutter head for cutting internal gearing by means of an end mill, 8 standard work supports for table dia. 1300 mm, standard work support with pulleys for table dia. 1500 mm, auxiliary work table dia. 2150 mm with work support, 4 work support for the auxiliary table dia. 2150 mm, work arbor support with bearing for cutting pinions and small diameter gears.

FO25

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S P E C I F I C A T I O N

Maximum module of gear; with max. chip removal				22			22	
with machine norm. loaded			30	25	18	30	25	18
Maximum diameter of gear; with max. chip removal	mm			2000			78.5"	
with machine norm. loaded	mm	2000	2500	3000		78.6"	98.5"	118"
Face capacity of gears; gears over 1500 mm in dia. with straight teeth	mm			800			31.1"	
gears bellow 1500 mm in dia. with straight teeth	mm			750			29.5"	
Maximum distance, hob spindle to working surface of table	mm			1320			52"	
Minimum distance, hob spindle to working surface of table	mm			400			15.7"	
Maximum distance, center line of hob spindle to center line of work arbor	mm			1630			64.3"	
Minimum distance, center line of hob spindle to center line of work arbor	mm			80			3.14"	
Diameter of work table	mm			1500			59"	
Bore of work table	mm			200			7.86"	
Number of T-slots in work table				6			6	
Diameters of hob arbors	mm	40	50	60	80	40	50	60 80
Hob spindle speeds; Number (by change gears only)				8			8	
In range R 40, φ = 1.26, ranging from	r. p. m.			12.5—63			12.5—63	
Output of main drive motor	HP			20			20	
Output of rapid traverse motor	HP			10			10	
Number of vertical feeds of hob slide				36			36	
Vertical feeds per 1 table revolution, ranging from	mm			0.2—6.00			0.0079"—2.36"	
Number of longitudinal feeds of work table				36			36	
Longitudinal feeds per 1 table revolution ranging from	mm			0.05—1.50			0.002"—0.059"	
Tangential feeds of hob slide				36			36	
Tangential feeds per 1 table revolution, ranging from	mm			0.10—3.00			0.004"—0.118"	
Feeds for cutting by individual indexing method with standard hob slide and side milling cutter; ranging from	mm/min.			1.15			0.163"	
Feeds for cutting by individual indexing method with cutter head and end mill, ranging from	mm/min.			6.15			0.251" per min.	
Floor space required	mm			1870 x 2610			192" x 104"	
Weight of machine with standard equipment	kg			21000			46,000 lbs	

IF IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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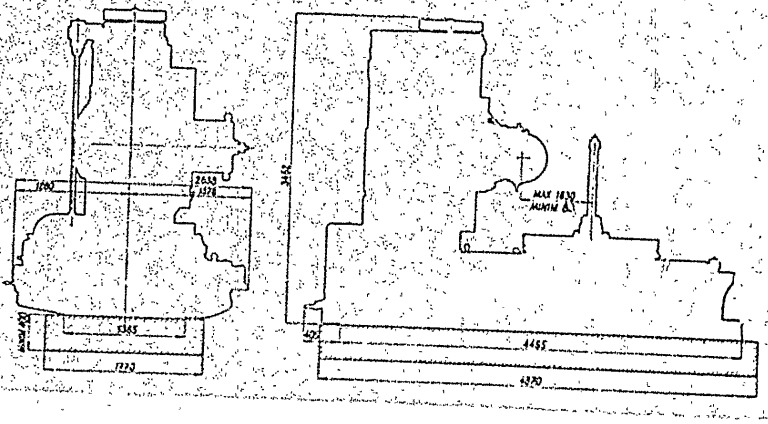

STROJEXPORT

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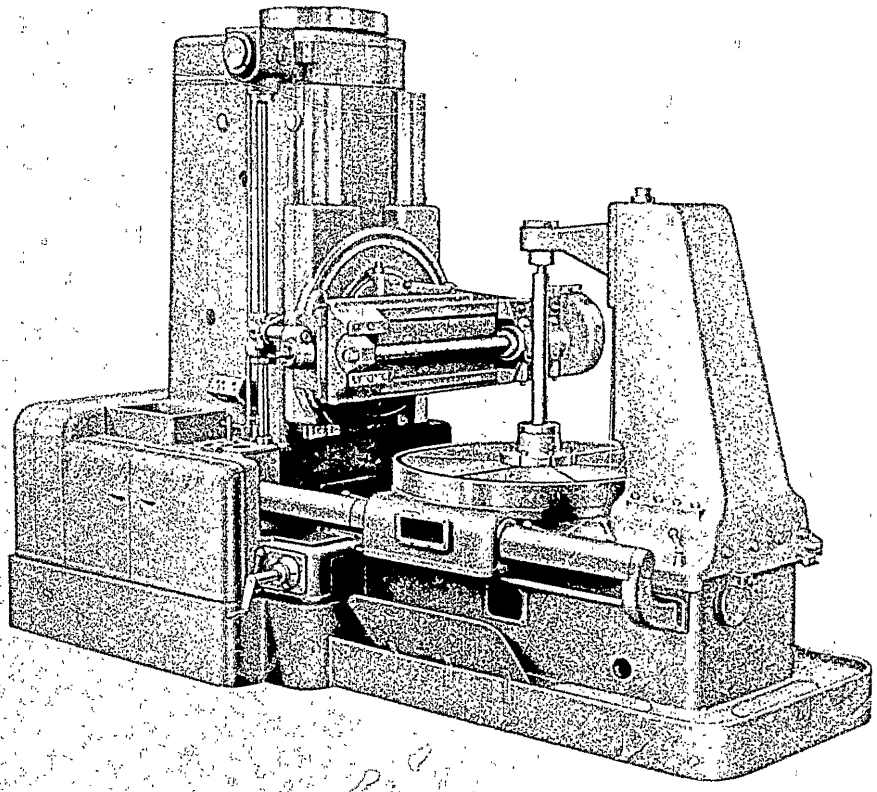

GEAR HOBBING MACHINE MODEL OF 16

The machine is designed for the intensive production of precision spur, helical and worm gears by the conventional hobbing method, as well as for the cutting of external and internal spur and helical gears by the single indexing process. On the machine worm gears may also be cut by the tangential method, by using a worm hob, or one or several cutters. The wide speed and feed range enables the cutting of all commonly used kinds of material.

TOS

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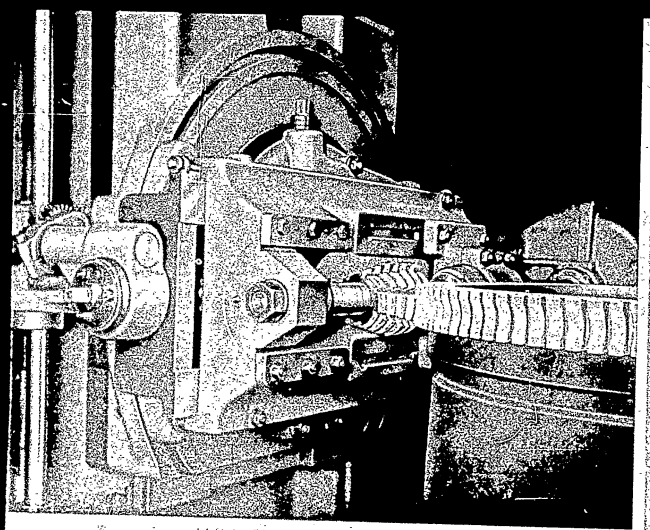
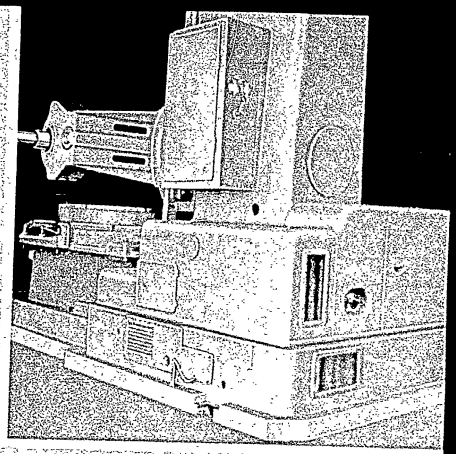


Gears for setting the number of teeth and for adjusting the helix angle

STANDARD EQUIPMENT: 2 electric motors to suit 380 or 200 volts, including electrical equipment, cooling system with electric pump, 4 hob arbors dia. 32, 40, 50 and 60 mm, 1 work arbor with differential nut and plate, hob setting gauge, set of index change gears, set of differential change gears, set of feed change gears, set of speed change gears, service spanners, operator's instruction booklet, operating plates and tables.



Rear view of machine

OPTIONAL EQUIPMENT: Attachment for cutting worm gears by the tangential method, attachment for cutting spur and helical gears by the individual indexing method, cutter head for cutting external gearing, cutter head for cutting internal gearing with an end mill, 8 standard work supports for hobbing gears up to dia. 1200 mm, 8 standard work supports for hobbing gears from dia. 1200 mm upwards, work arbor support with bearings for cutting pinions and small diameter gears.

Description

THE DRIVE is by belts from the main motor through the gear box to the hob spindle drive mechanism, whence the power is transmitted to the worm gears for setting the number of teeth of the gear to be cut and to the hob slide feeding mechanism, as well as to the [illegible] of the work table feed. For cutting helical gears a differential gearing with [illegible] is provided, which are set on hand of the instruction booklet to suit the desired helix angle. Starting and stopping of the machine is accomplished from the operator's position by push buttons and remote controlled contactors.

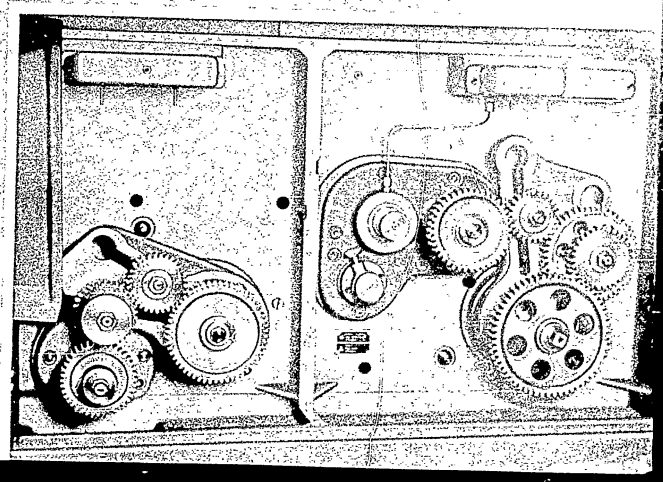
THE HOB SLIDE with the accurately mounted hob spindle is swivelled by power and vertically adjusted on the ground flat guides of the stanchion. The hob slide and work table feeds are automatically disengaged by adjustable stops. The hob slide and the work table are moved by rapid traverse. To ensure correct alignment between the hob and the work table, the machine is fitted with a hob setting gauge which is supplied as standard equipment.

THE WORK TABLE is mounted on a shouldered, conical, vertical shaft which is provided on its lower end with a cylindrical centering pin. It is driven by a precision gearing with a hardened and ground worm for eliminating backlash and obtaining a correct, full tooth contact. While cutting the table is hydraulically relieved by the bearing of the cylindrical centering pin. The position of the work table and hob slide is easily checked on scales with vernier.

THE STANCHION with flat and ground guideways is firmly attached to the bed unit and its rigid construction ensures a quiet and accurate operation even at peak output.

LUBRICATION. The oil is delivered to all important points by an automatic lubricating system.

COOLING. A motor-driven electric pump supplies the coolant from a tank located inside the bed.



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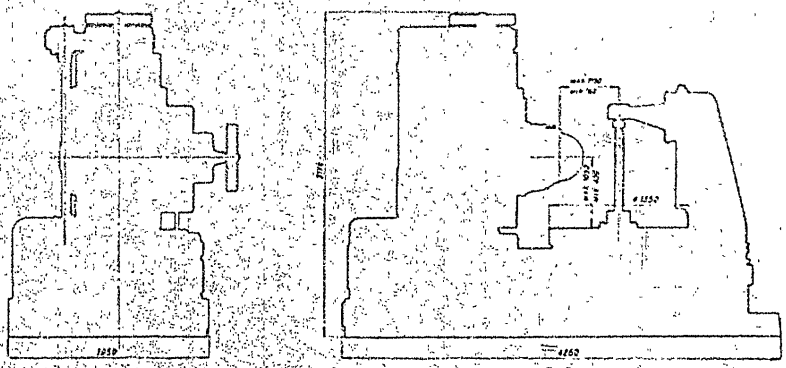

Specification

		Metric	English
Maximum modul of gear: with max. chip removal		16	16
with machine norm. loaded		20	20
Max. diameter of the hobbed gear: with max. chip removal	mm	1600	63"
Max. dia. without stanchion with machine normally loaded	mm	2000	78.5"
Face capacity of gears:			
gears over 1350 mm in dia. with straight teeth	mm	560	22"
gears under 1350 mm in dia. with straight teeth	mm	500	19.7"
Maximum distance, hob spindle to working surface of table	mm	1050	41.4"
Minimum distance, hob spindle to working surface of table	mm	400	15.7"
Maximum distance, center line of hob spindle to center line of work arbor	mm	1150	45.2"
Minimum distance, center line of hob spindle to center line of work arbor	mm	100	3.9"
Diameter of work table	mm	1350	53"
Bore of work table	mm	180	7.1"
Number of T-slots		8	8
Diameters of hob arbors	mm	32-40-50-60	
Hob spindle speeds: Number (by change gears only)		8	8
In range R 10, $\varphi = 1.26$, ranging from	r. p. m.	16-80	16-80
Output of main drive motor	HP	15	15
Output of rapid traverse motor	HP	7.5	7.5
Number of vertical feeds of hob slide		36	36
Vertical feeds per 1 table revolution, ranging from	mm	0.25-6	0.01"-0.23"
Number of longitudinal feeds of work table		36	36
Longitudinal feeds per 1 table revolution, ranging from	mm	0.05-1.5	0.002"-0.006"
Number of tangential feeds of hob slide		36	36
Tangential feeds per 1 table revolution, ranging from	mm	0.1-3	0.004"-0.12"
Floor space required	mm	4300×2000	170"×79"
Weight of machine with standard equipment	kg	18100	lbs 40.000

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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PRAHA — CZECHOSLOVAKIA

ČOK 53079 4 - 2048 Printed in Czechoslovakia - Svět tl. 844-55

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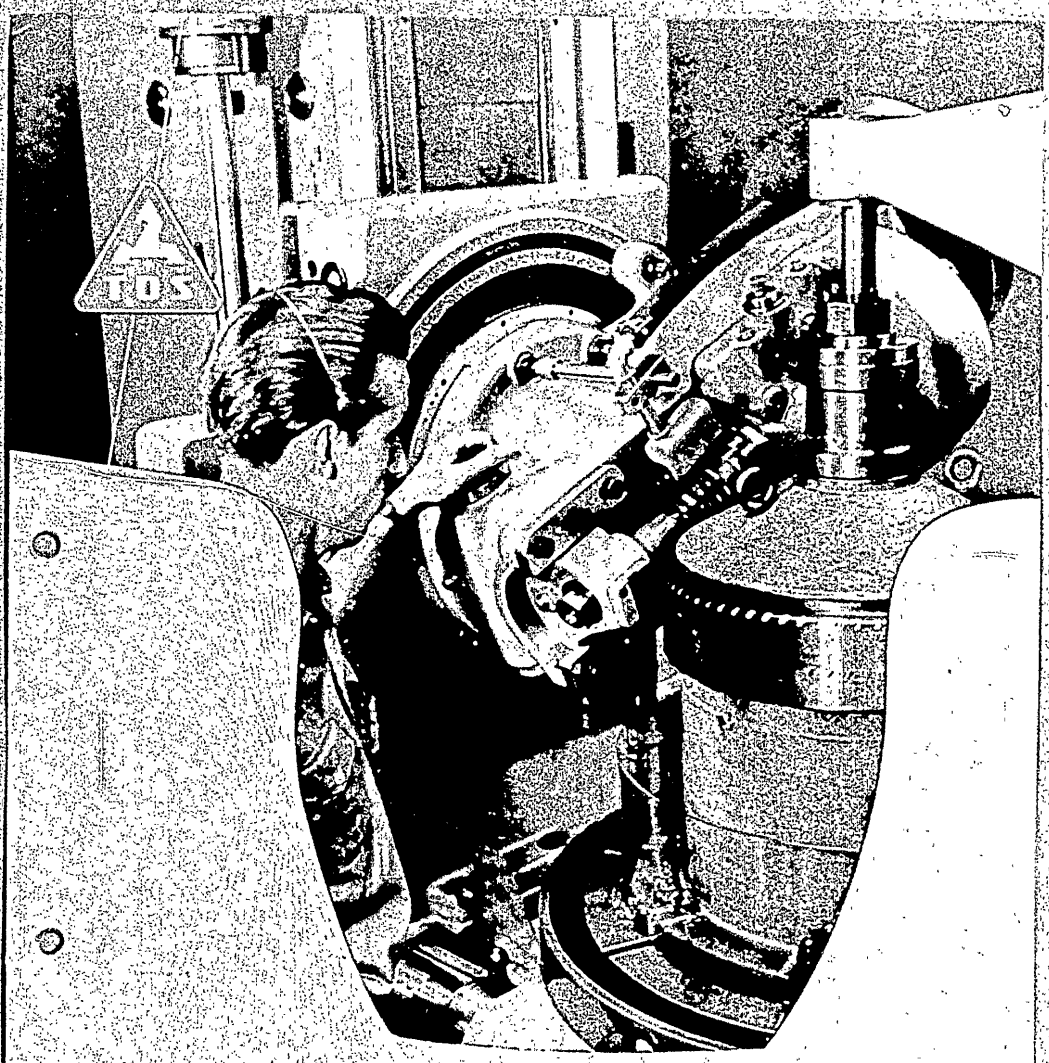

GEAR HOBBING MACHINE

Model 10

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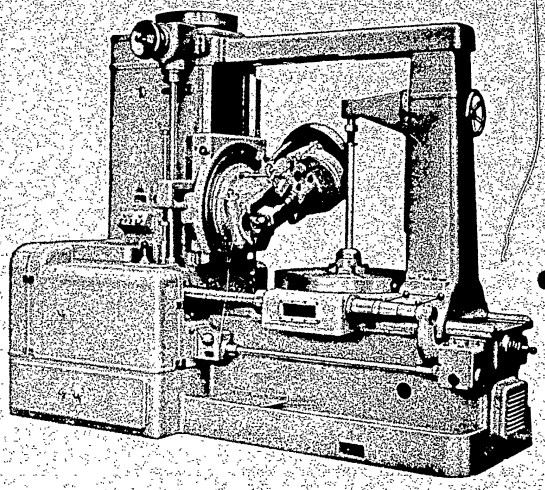


GEAR HOBBING MACHINE

Model

This Heavy Duty Gear Hobbing Machine is intended for the intensive production of precision spur, helical and worm gears by the conventional hobbing method. Worm wheels can also be cut by the tangential method. The wide speed and feed range enables the cutting of all commonly used kinds of material.

THE DRIVE

is by belts from the main drive motor through the gearbox to the hob spindle mechanism and to the index worm gearing for setting the number of teeth of the gear to be cut, whence the power is transmitted to the hob slide feeding mechanism and to the work table. For cutting helical gears a differential gearing with change gears for setting the helix angle is interposed in the driving mechanism. The table for setting these change gears are to be found in the operator's instruction booklet. The machine is started and stopped from the operating position by pushbuttons for the remote control of the protective contactors.

THE HOB SLIDE

with the accurately mounted hob-spindle may be swivelled and vertically adjusted on the prismatic and ground guideways of the stanchion. The hob slide and the work table feeds are automatically disengaged by adjustable stops. Power rapid traverse is provided for rapidly moving the hob slide and the work table to the required position. To ensure correct alignment between the hob and the work table the machine is fitted with a hob setting gauge which is supplied as standard equipment.

THE WORK TABLE

is driven by a new, special worm and gear, designated „Dual Lead Worm Gearing" permitting to eliminate backlash and to obtain a correct, full tooth contact.

THE STANCHION

with the hob slide, and the work arbor support are connected by the overarm, thus forming together with the bed unit a compact frame for increasing the rigidity and ensuring a quiet and accurate cutting operation even at peak output. The position of the work table and hob slide is easily checked on scales with vernier.

LUBRICATION

The oil is delivered to all important points by an automatic lubrication system.

COOLING

A motor-driven electric pump supplies the coolant from a tank inside the bed.

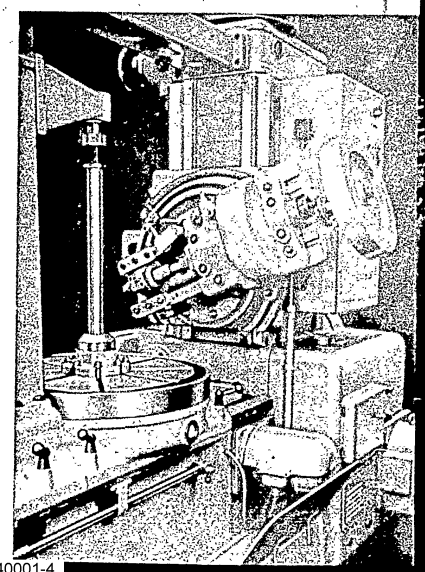
STANDARD EQUIPMENT

2 electric motors for 380 or 220 volts including electrical equipment, cooling system with electric pump, 2 hob arbors dia 32 and 40 mm, 1 work arbor with differential nut and plate, hob setting gauge, work arbor support with bearing, set of index change gears, set of differential change gears, set of speed change gears, set of feed change gears, set of service spanners, operator's instruction booklet, operating plates and tables.

OPTIONAL EQUIPMENT

Attachment for cutting worm gears by the tangential method, attachment for cutting by the individual indexing method by means of a side milling cutter, two sets of cast iron work supports for gears of various diameters, one set consisting of 8 work supports.

In ordering, specify voltage phase and frequency of power supply!



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SPECIFICATION:

Maximum module of gear: with max. stock removal		10	10
with machine norm. loaded		12	12
Maximum diameter of gear without stanchion:			
with max. stock removal	mm	1000	39.3"
with machine norm. loaded	mm	1250	49.2"
Maximum diameter of gear (with stanchion)	mm	750	29.5"
Face capacity of gears: gears over 850 mm in dia. with straight teeth	mm	400	15.7"
gears up to 850 mm in dia. with straight teeth	mm	350	13.8"
Maximum distance, hob spindle to working surface of table	mm	740	29.1"
Minimum distance, hob spindle to working surface of table	mm	280	11"
Maximum distance, center line of hob spindle to center line of work arbor	mm	720	28.3"
Minimum distance, center line of hob spindle to center line of work arbor	mm	50	1.96"
Diameter of work table	mm	850	33.1"
Bore of work spindle	mm	100	3.93"
Number of T-slots in work table		8	8
Diameters of hob arbors	mm	32—40	1¼—1½
Hob spindle speeds: Number		9	9
In range R 10 φ = 1.26, ranging from	r. p. m.	20—125	20—125
Output of main drive motor	HP	10	10
Output of rapid traverse motor	HP	4	4
Number of vertical feeds of hob slide		36	36
Vertical feeds per 1 table revolution, ranging from	mm	0.2—6.00	0.0079"—2.36"
Number of longitudinal feeds of work table		36	36
Longitudinal feeds per 1 table revolution, ranging from	mm	0.05—1.50	0.002"—0.059"
Number of tangential feeds of hob slide		36	36
Tangential feeds per 1 table revolution, ranging from	mm	0.133—4.00	0.0052"—0.157"
Feeds when cutting by the individual indexing method with standard hob slide and side milling cutter	mm/min.	2.5	0.09" p. m.
Floor space required	mm	3120—1840	126" x 72.5"
Weight of machine with standard equipment	kg	9350	20 570 lbs

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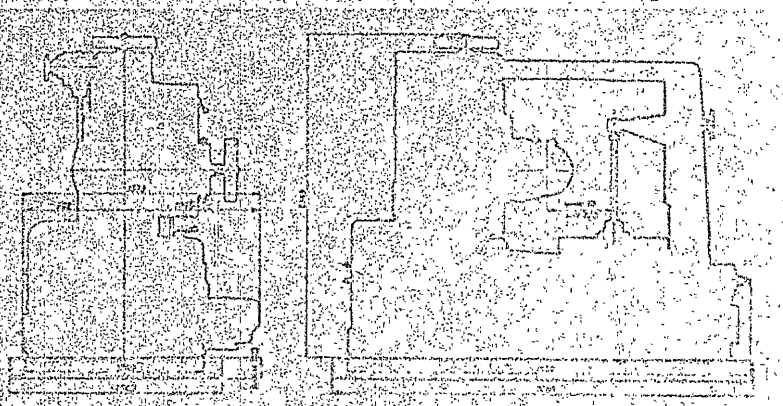

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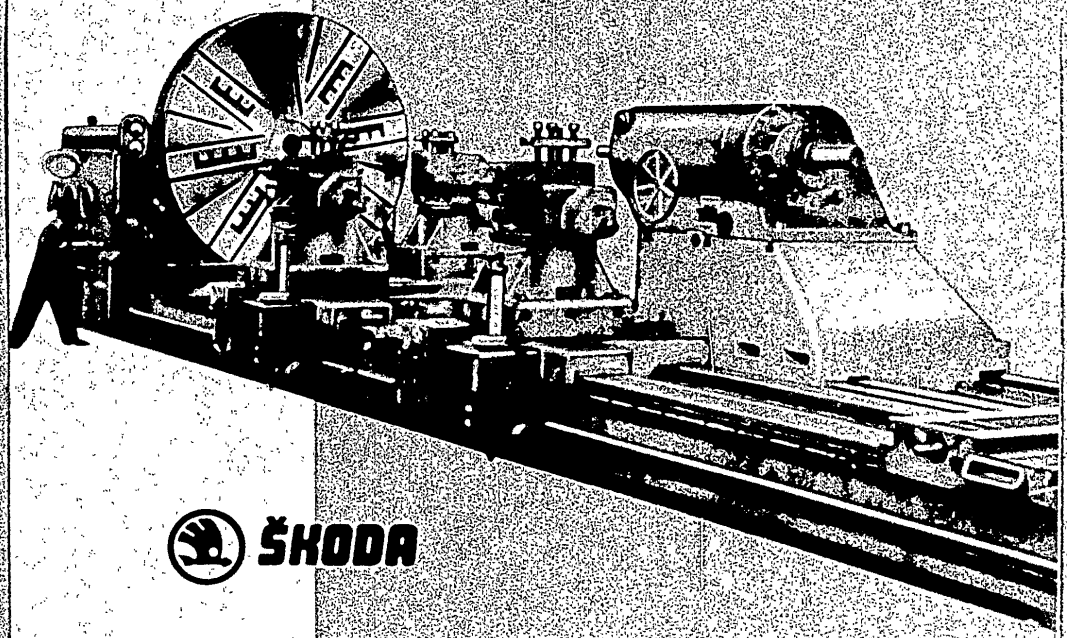
STROJEXPORT

Center Lathe

S 3150·D4

S 3150·D4



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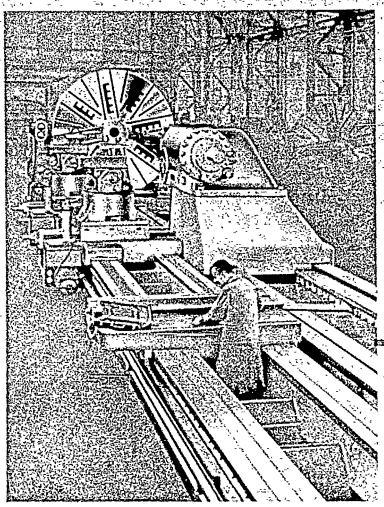
Center Lathe

S 3150·D4

The machine is designed for the utilization of cemented carbide tipped tools. It has a wide range of speeds, develops a high torque on the face plate and has a high power motor.

The machine has a bed with four guideways. On the two front guideways the front carriages are moving, on the two rear guideways the rear carriages, and the rests and tailstock are also fitted on them so that the front carriages can travel through the entire length past the rear carriages, the rests and the tailstock. Every carriage has all the mechanisms for changing the rate, direction and sense of feed so that each carriage can work independently. The front as well as the rear carriages have their independent drives from a feed shaft. The machine is driven by a slip-ring induction motor without brush lifting device.



SPECIFICATION

• Working Range			
Height of centers	mm	1600	63"
Maximum swing over bed	mm	3150	124"
Maximum swing over carriage	mm	2600	102"
Maximum weight of workpiece without rests	kgs	20000	44000 lbs
Maximum torque on face plate	mkg	30600	217000 ft.-lbs
• Headstock			
Diameter of spindle in front bearing	mm	710	28"
Number of speeds			23
Range of speeds	r.p.m.		0.35 to 71
Taper in spindle			1:10
Diameter of taper in spindle	mm	250	9⅞"
Diameter of face plate	mm	3150	124"
• Carriages			
Longitudinal feeds:			
Range I, for all spindle speeds: number of feeds			18
range, per revolution	mm	0.125 to 6	0.005" to 0.24"
Range II, for 12 lower spindle speed ranging from 0.35 to 4.5 r. p. m.: number of feeds			18
range, per revolution	mm	1 to 48	0.04" to 1⅞"
Cross feeds and feeds of cross slides equal 0.4 times longitudinal feeds.			
Rapid traverse of carriages on bed, per minute	mm	3000	9'10"
• Screwcutting by means of Pinion and Rack			
Only metric threads, coarse, on entire turning length.			
Leads of threads indentical with longitudinal feeds.			
• Tailstock			
Diameter of tailstock sleeve	mm	150	17⅝"
Diameter of taper in tailstock sleeve	mm	220	8⅝"
Taper in tailstock sleeve			1:10
Rapid traverse of tailstock on bed, per minute	mm	2300	7'6"
Rapid traverse of tailstock sleeve, per minute	mm	600	2'0"
• Steady Rest			
Clear diameter	mm	1500	59"
Carrying capacity of rest at surface speed of 150 metres (492 ft.) per minute	tons		50
• Roller Support			
Maximum clear diameter without base	mm	2600	102"
Minimum clear diameter without base	mm	2000	78"
Maximum clear diameter with base	mm	2083	76"
Minimum clear diameter with base	mm	1500	59"
Carrying capacity of roller support at surface speed of 150 metres (492 ft.) per minute	tons		50
• Boring Equipment			
Maximum boring depth in one paw	mm	3000	16'4"
Maximum diameter of boring bar	mm	1700	67"
Boring feeds:			
Range I, for all spindle speeds: number of feeds			18
range, per revolution	mm	0.125 to 6	0.005" to 0.24"
Range II, for 12 lower spindle speeds ranging from 0.35 to 4.5 r. p. m.: number of feeds			18
range, per revolution	mm	1 to 48	0.04" to 1⅞"
Rapid traverse of boring bar bearings on bed, per minute	mm	3000	9'10"
Rapid cross traverse of boring bar bearings, per minute	mm	1200	3'11"
Quantity of coolant per minute	litres	900	60 Imp. Gallo.
Pressure of coolant	atm.	12	170 psi
• Drive			
Main Motor: output	kW		110
speed	r.p.m.		970
Motor for rapid traverse of carriage: output, 5 minute rating	kW		3
speed	r.p.m.		1410
Motor for rapid traverse of tailstock: output, 5 minute rating	kW		7.5
speed	r.p.m.		1410
Motor for rapid traverse of tailstock sleeve: output, 5 minute rating	kW		1.4
speed	r.p.m.		1440
• Weights and Dimensions			
Floor space required by machine with length of 15000 mm (492") between centers, approx.	mm	6650 · 22500	19'11" · 73'10"
Net wright of machine with length of 15000 mm (492") between centers and standard equipment, approx.	kg	185 000	407 500 lbs

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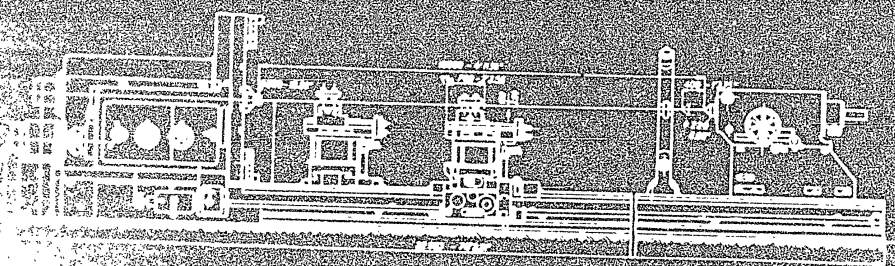
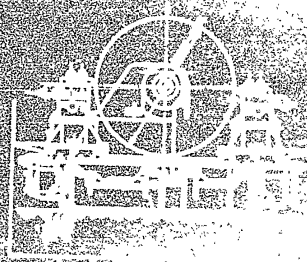
ITS OUTSTANDING FEATURES

- High speed of main spindle
- Wide range of speeds
- Special mounting of spindle
- Protected guideways of bed
- Spring cushioned thrust of tailstock sleeve
- High rigidity of machine
- Simple operation
- Live tailstock center

ŠKODA





BRIEF DESCRIPTION OF MAIN PARTS

THE DRIVE. The headstock is driven by a slip-ring induction motor with a starting clutch. When the drive is switched off a brake is automatically applied which considerably reduces the coasting period of the machine. The brake can be cut out of operation, e. g. for the changing of speeds.

THE GEAR BOX which contains all the gear mechanisms for the drive and reversal of the spindle forms an independent unit. The speeds are changed by a sliding movement of gears on spline shafts. All the countershafts of the gear box are mounted in anti-friction bearings. The gear box also contains the drive of the feed shafts. The gear box has its own automatic lubricating system with automatic visual checking. When the machine is running a speed indicator indicates the spindle speed which is engaged and an ammeter the load of the main motor.

THE HEADSTOCK is formed by a separate box containing only the main spindle bearings. No gear is keyed to the spindle to ensure smooth operation of it. The radial bearings of the spindle are plain bearings with steel bearing shells lined with special bearing metal. The design of the front bearing reliably prevents the occurence of edge pressures when the spindle is loaded with the maximum permissible load of the workpiece and thus also heating of the bearing even at the highest speeds. Special care has been devoted to the manufacture of the bearing shells so that no running-in is necessary. The bearings of the spindle have their own automatic lubricating system with automatic visual and acoustic checking. The temperature of the bearings is guarded automatically. The thrusts upon the spindle are taken up by an anti-friction bearing. The face plate is pressed on the spindle. It is made of steel and can be fitted with right jaws.

THE BED has four guideways. On the two front guideways the front carriages are moving. The two rear guideways are so divided that they form independent tracks for the rear carriages and independent tracks for the rests and the tailstock. This design permits all the guideways for the front and rear carriages to be covered by long steel guards and thus a lasting accuracy of the machine to be maintained. The rests, tailstock and carriages are so designed that the front carriages can move freely on the entire length of the bed past the rear carriages, rests and tailstock. The bed is very rigid box shaped and stiffened with ribs and its main load carrying wall which takes up the heaviest pressures produced by the weight of the workpiece is provided with particularly densely spaced ribs and located exactly in the vertical centre-line of the machine. The occurance of dangerous edge pressures of the longitudinal carriages on the guideways of the bed is prevented by relieving gibs.

THE CARRIAGES have their own mechanism for changing the rate, direction and sense of the working feed, rapid traverse and hand feed so that any operation can be done by any carriage quite independently. The carriage boxes contain safety equipment for protection against overload. A working power feed and a power operated rapid traverse are available for the longitudinal and transverse carriages as well as for the cross slides. The upper part of the carriage can be turned to any angle. The cross slides have a transverse tool slide for fine hand adjustment of the tool for the depth of cut. The longitudinal movement of the carriage is only power operated.

THE TAILSTOCK has a tailstock sleeve with a dead center which can be replaced by one with a live center. Both have an expansion equipment to take up the increase in length of the workpiece due to heating. The tailstock has a power operated movement on the bed, the tailstock sleeve has a power operated rapid traverse and a very fine hand operated movement for clamping by a heavy force. The two movements of the tailstock sleeve can be operated at any time independently of each other, without any changing over. The tailstock is locked in its position on the bed by a pawl in a rack on the inside of the rear guideways of the bed.

THE RESTS are set up on the rear half of the bed. They have cylindrical sliding jaws fitted with shocs of special bearing metal. The machine can be equipped, for supporting of heavy workpieces, with roller supports one of which may be designed as a centering one.

THREADS of metric sizes can be cut on the entire turning length by the usual transmission of the carriage, i. e. by a pinion engaging with a rack on the bed. By this method threads of a standard grade can be cut the leads of which are identical with the feeds listed in the table.

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S 3150·D4

STANDARD EQUIPMENT

1 face plate with 4 jaws, pressed on spindle
1 complete front carriage
1 complete rear carriage
1 tailstock for dead center
1 steady rest, 1500 mm (59") dia.
2 dead centers
1 gear type oil pump for lubrication of gear box
1 gear type oil pump for lubrication of headstock
2 lamination type oil cleaners
1 set of spanners, cranks, indicating plates and tables necessary for attendance of machine.

Complete electrical equipment

1 main motor, 110 kW, 970 r. p. m., with starting clutch
2 motors for rapid traverse of carriage, 3 kW/5 min., 1410 r. p. m. (one motor for each carriage)
1 motor for rapid traverse of tailstock, 7.5 kW/5 min., 1440 r. p. m.
1 motor for rapid traverse of tailstock sleeve, 1.4 kW/5 min., 2770 r. p. m.
1 motor for drive of oil pump, 2.2 kW, 1400 r. p. m.
1 motor for drive of oil pump, 0.185 kW, 2800 r. p. m.
1 main contactor cabinet with appropriate switchgear and protective and signalling equipment
2 contactor cabinets of carriage with appropriate switchgear and protective equipment and socket for light fixture (1 contactor cabinet for each carriage)
1 contactor frame of tailstock with switchgear and protective equipment
1 brake magnet for main motor
1 ammeter
1 speed indicator with transmitter dynamo
2 lubrication guards with signal lights
1 signalling thermometer with visual and acoustic signalling equipment
1 push-button panel on headstock
2 push-button panels on tailstock
2 portable push-button boxes for control of headstock and carriage (1 box for each carriage)
limit switches for carriages, tailstock and tailstock sleeve, current collector line and wiring material
1 light fixture for carriage

OPTIONAL EQUIPMENT

Additional front carriage with electrical equipment	kg	8300	18300 lbs
Additional rear carriage with electrical equipment	kg	8825	19460 lbs
Additional rest, 1500 mm (59") dia.	kg	3855	8500 lbs
Roller support without base	kg	3000	6610 lbs
Roller support with base	kg	4280	9440 lbs
Attachment for turning of slender tapers	kg	14	31 lbs

Tailstock sleeve with live center (on request)

Boring equipment comprising:

1 complete front guide bearing for 700 mm (27½") dia. boring bar — kg 5350 | 11790 lbs
1 boring bearing for 700 mm (27½") dia. boring bar — kg 2040 | 4500 lbs
1 centrifugal pump for hydrol with electric driving motor and electrical equipment
piping and fittings for cooling equipment
1 cover for face plate for collection of chips and coolant
1 cover for bored end of workpiece for collection of chips and coolant

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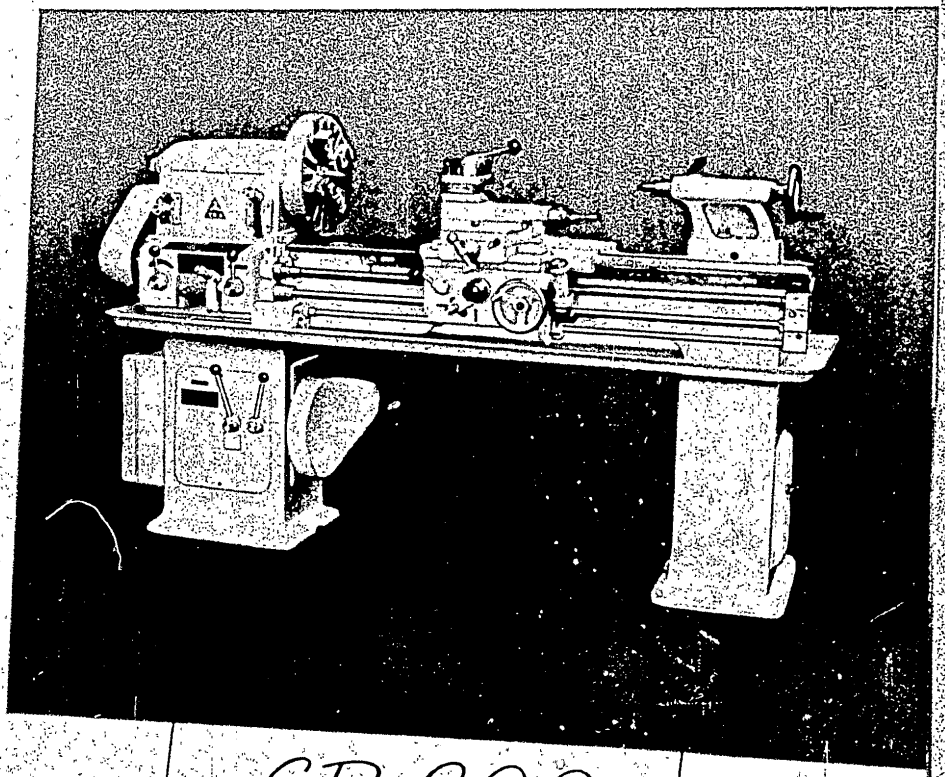

SR 200

TOS

CENTRE LATHE

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SR 200 CENTRE LATHE

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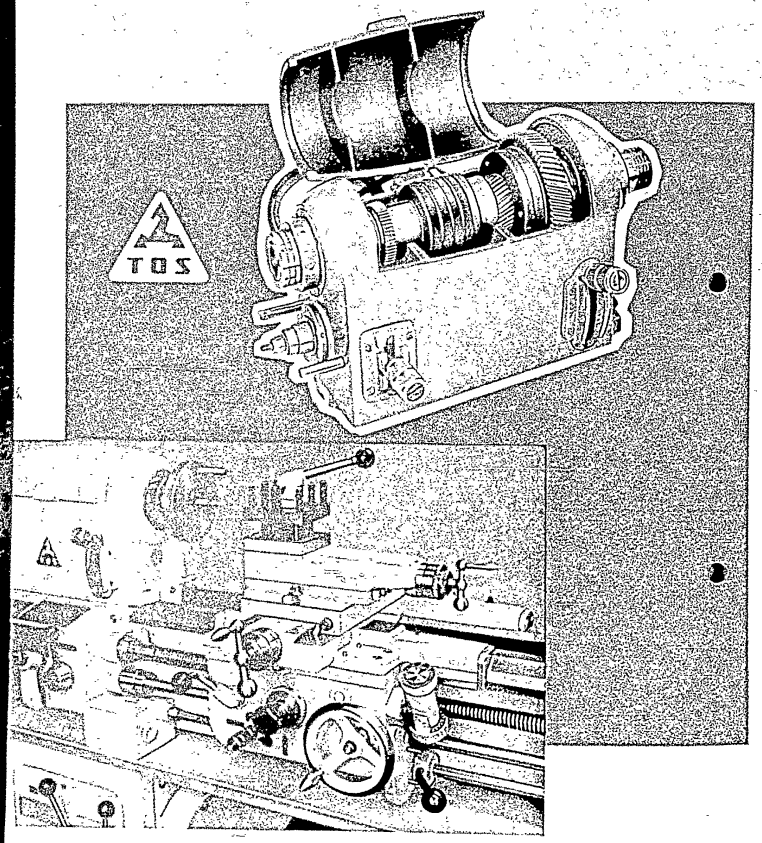


CENTRE LATHE SR 200. This machine is well-suited for all common turning operations with guaranteed accuracy according to Schlesinger limits. — Spindle speed range 30—750 r. p. m. — Feed range 0.06—0.92 mm/rev. — Cutting of all commonly used metric and Whitworth threads. — Removable bridge in front of face plate — Individual motor drive — Ease of operation.

DESCRIPTION

Headstock. The spindle runs in adjustable plain bearings. End thrust is taken up by an axial ball bearing. The spindle is driven from the gearbox located inside the column either directly or through a reducing countershaft.

The gear-box is totally enclosed and contains gears giving 4 spindle speeds changed by two hand levers. A special device does not permit to operate these levers simultaneously thus preventing any damage to the machine due to incorrect operation. The power is transmitted from the electric motor to the gear-box by V-belts.

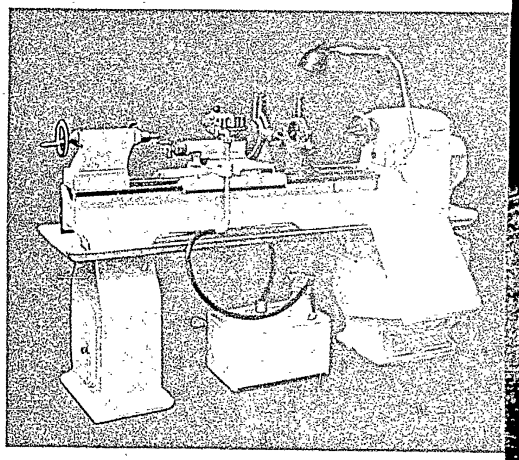
The quick change gear-box enables a rapid selection of feeds and threads The machine is adapted for cutting all commonly used metric and Whitworth threads.

The carriage with power longitudinal and cross feed is equipped with a 4-way tool holder.

The bed has carriage guideways which are prismatic at the front and flat at the rear. In front of face plate a gap is provided with an accurately fitted removable bridge.

The tailstock is cross adjustable. The tailstock centre sleeve may be easily shifted.

Drive. The machine is driven by an electric motor attached to a slide for correct belt tension. Starting and stopping of motor is accomplished by a hand lever operated switch, the lever being situated on the right-hand side of the apron.



Standard equipment: 4-jaw face plate, catch plate, 4-jaw tool holder, thread indicator, 2 lathe centres Morse No. 2, reducing sleeves, set of change gears, set of spanners, operating instructions, name plate.

Optional equipment: flange for universal chuck dia. 200 mm, steady and follow rest, 1 universal 3 jaw chuck ⌀ 200 mm, 1 set of change gears for modale threads, cooling equipment with electric motor, electric lighting.

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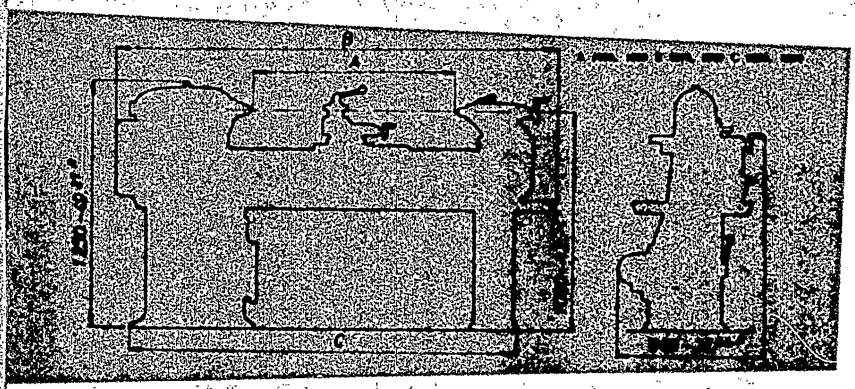
SPECIFICATIONS

		Metric		English	
Swing over bed	mm	500		19 1/4"	
Swing in gap	mm	550		21 5/8"	
Useful clearance in front of face plate	mm	135		7"	
Swing over carriage	mm	240		9 1/2"	
Distance between centres	mm	1000 or 1500		39 1/2" or 59"	
Bore of spindle	mm	35		1 3/8"	
Taper in spindle	metric	60		60	
Taper of lathe centres	Morse	2		2	
Spindle nose according to DIN 800		M 60		M 60	
Maximum swing with steady rest	mm	90		3 1/2"	
Maximum swing with follow rest	mm	90		3 1/2"	
Width of bed	mm	265		10 1/4"	
Diameter of face plate	mm	360		14 1/8"	
Diameter of catch plate	mm	160		6 1/4"	
Maximum section of tool	mm	22 × 22		7/8"	
Spindle speeds: Number		8		8	
Range	r. p. m	30–750		30–750	
Longitudinal feeds: Number		32		32	
Range	mm/rev.	0.06–0.92		cuts p. inch: 28–424	
Cross feeds	mm/rev.	0.02–0.31		cuts p. inch: 84–1272	
Pitch of lead screw	t. p. i.	4		4	
Threads: Metric, pitch	mm	0.2–6		0.2–6	
Whitworth, threads per inch	t. p. i.	4–60		4–60	
Electric motor: Speed	r. p. m	1420		1420	
Output	HP	2		2	
Dimensions and weights for distance between centres	mm	1000	1500	39 1/2"	59"
Floor space required	mm	960×2150	960×2650	37,79"×84,65"	37,79"×104,33"
Weight of machine: with standard equipment	kg	795	845	lbs 1750	lbs 1860
with packing	kg	825	880	lbs 1820	lbs 1940
with seaworthy packing	kg	1055	1150	lbs 2320	lbs 2530
Contents boxed	m³	3.1	3.8	cu. ft. 110	cu. ft. 134
Size of case	cm	93×150×218	93×150×268	37"×59"×85"	37"×59"×105"



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ČSN 320017a — 5509 — SHT 04

Printed in Czechoslovakia

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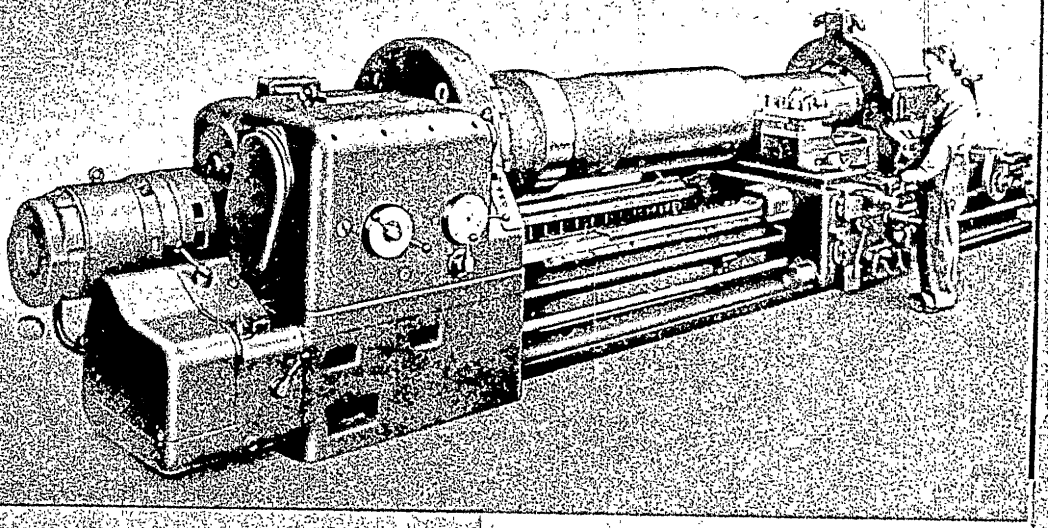

TYPES

SR 1000
SR 1250

ŠKODA

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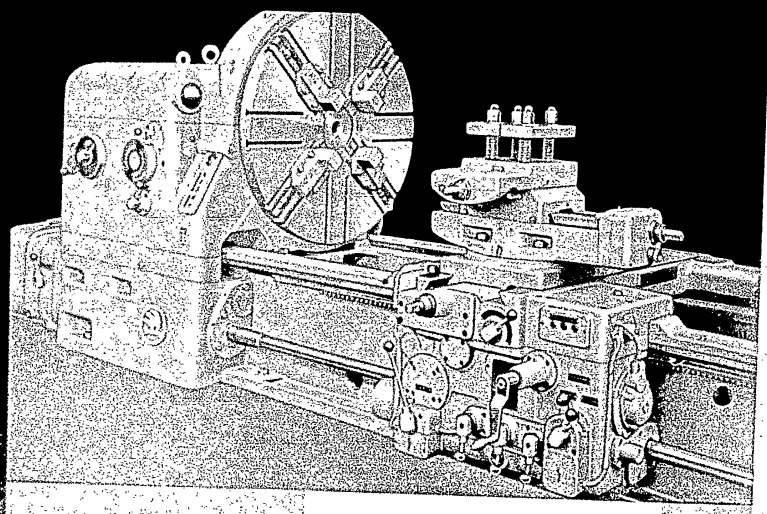

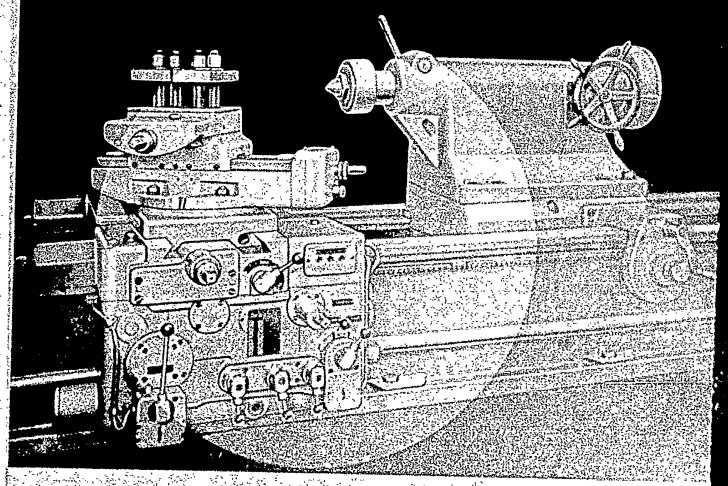

SR 1000
SR 1250

HIGH-SPEED CENTER LATHES

These machines are designed for a full utilization of cemented carbide tipped tools but are also suitable for taking a heavy cut with a high-speed steel tool.

OUTSTANDING FEATURES:

- high speed of main spindle
- wide speed range
- spindle running in anti-friction bearings
- high rigidity of machine
- simple operation of machine
- protected guideways of bed

Standard equipment

2 dead centers with No. 6 Morse taper and 90° point (SR 1000)
1 face plate pressed onto spindle
1 500 mm (20") dia. rest (SR 1000)
1 630 mm (25") dia. rest (SR 1250)
1 center for spindle with No. 6 Morse taper and 60° point (SR 1000)
1 live center for tailstock with No. 6 Morse taper and 60° point (SR 1000)
1 center for spindle with Metric 80 taper with 90° point (SR 1250)
1 tailstock sleeve with built-in live center with Metric 80 taper and 90° point (SR 1250)
1 set of change gears for turning of steep tapers (1:50 and above) and [illegible] maximum length of 10000 mm (32'10")
1 set of change gears for screwcutting
1 gear type oil pump
1 oil cleaner
1 hand grease gun
1 set of tools for attendance, instructional tables and indicating plates
1 electrical equipment comprising:
- 1 main squirrel cage induction motor, 34 kW, 1440 r. p. m. with starting clutch
- 1 squirrel cage induction motor for rapid traverse of carriage, 1.3 kW, 2820 r. p. m.
- 1 squirrel cage induction motor for lubricating oil pump, 0.185 kW, 2800 r. p. m.
- 1 ammeter
- 1 brake solenoid
- 1 lubrication guard with signal lamp
- 1 main contactor cabinet (separate from machine) with main switch, transformers and necessary switchgear and protective equipment
- 1 contactor cabinet on carriage slide with transformers and corresponding switchgear and protective equipment
- 1 spot light for carriage
- push button switches for control of motors
- light socket, connecting leads, equipment for carriage and sundry wiring material

Optional equipment

Additional carriage with electrical equipment
Revolving four-way tool post
300 mm (12") dia. rest (SR 1000)
400 mm (15.7") dia. rest (SR 1250) or 500 mm (20") dia. rest (SR 1000)
Change gears for machining of steep tapers (for shorter turning lengths)
Lead screw with sliding clasp nut for machining of precision threads, with accessories
Roller jaws for 300 mm (12") dia. rest (SR 1000)
Roller jaws for 400 mm (15.7") dia rest or 500 mm (20") dia. rest (SR 1000)
Extensible templates for turning of tapers
Special upper slide for machining of crankshafts
Special rests for machining of crankshafts

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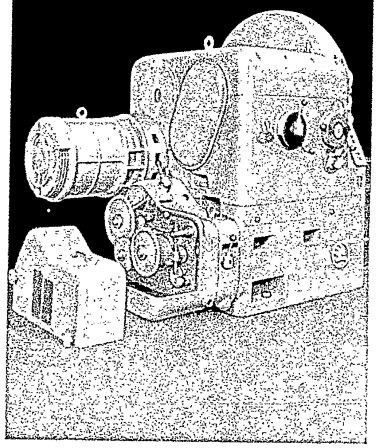
Description

The Drive, [illegible] driven by a three phase squirrel cage induction motor through a starting clutch which absorbs the starting current surges in the mains. The period required by the machine to come to a standstill is reduced to a minimum by an automatic brake operated by a solenoid. The motor is started and stopped by push buttons on the headstock or on the carriage. The latter has in addition a push button for slight rotary movements of the spindle to facilitate the setting up of the machine.

The Headstock [illegible] totally enclosed. Correctly arranged ribs provide for the dissipation of heat. The drive motor is fitted directly to the headstock and coupled to the [illegible] by means of a starting clutch. The speeds are [illegible] by sliding gears keyed on splined shafts which [illegible] in taper bearings.

[illegible] are mounted on anti-friction bearings which [illegible] the shafts running. Any end play is taken up [illegible] bearing.

[illegible] of special steel and hardened teeth. [illegible] for which all speeds have ground teeth. [illegible] by a [illegible] and the oil being circulated [illegible] gear pump. An oil [illegible] with a [illegible] sight glass [illegible] connected to the [illegible] electric circuits (e.g. main [illegible] the pump, and electrical [illegible] the event of a [illegible] failure.



The Face Plate [illegible] mounted on the end of the spindle and rigidly bolted to its flange. It is provided [illegible] slots.

The Bed [illegible] and is so formed that no swarf can lodge. The chips drop through wide passages [illegible] they are easy to remove without interruption of the work on [illegible] and [illegible] at the distance between centers may be lengthened.

The [illegible] for changing and reversing the feed and a motor [illegible] and with an upper tool slide. The tool [illegible] SR 1250 also [illegible] Apart from the usual feeds of the longitudinal [illegible]

Screwcutting [illegible] For the [illegible] the same [illegible]

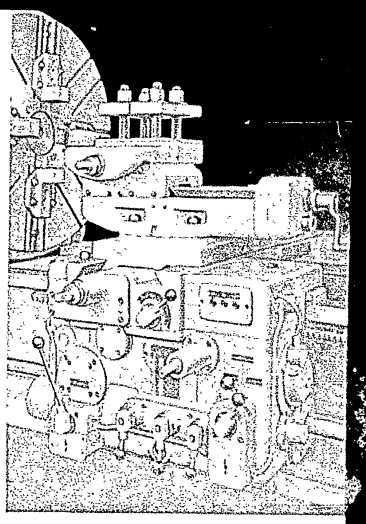
turning of precision threads the machine can be equipped with a lead screw which may be supplied with the machine as optional equipment. Threads can be cut on the entire turning length. A special 8 : 1 step up gear permits the cutting of steep threads.

The Tailstock is moved along the bed by a crank and secured against reverse movement by a catch. The tailstock sleeve is moved by means of a hand wheel at the front of the tailstock. The standard dead centre can be replaced by a live centre (on the type SR 1000) or the tailstock sleeve can be replaced by another one with a built-in live centre. (The tailstock sleeve of the type SR 1250 is equipped only with a live centre.) The upper part of the tailstock can be moved crosswise within narrow limits.

The Rest is enclosed and divided. It has adjustable jaws with a flat guiding surface. They can be replaced by jaws with guide rollers.

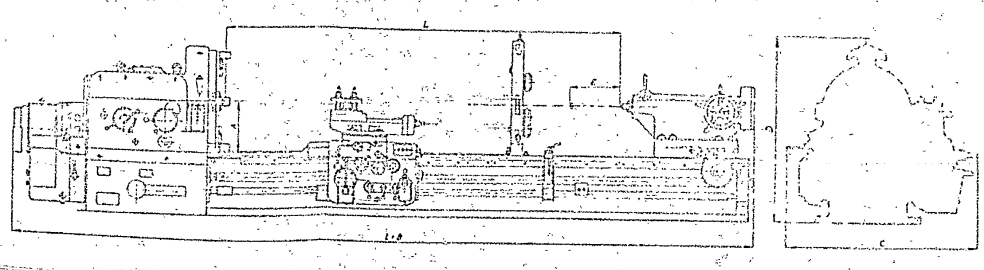
The Controls of the machine are easy and quick to operate and are centralized at the operator's post. All motors are started and stopped by push-buttons, the arrangement being such that the main motor can be controlled from the headstock as well as from the carriage.

These Lathes are manufactured with centre-to-centre distances up to 12 metres (39'4") arranged in 1000 mm (3.3') increments.



	A	C	D	E	L	L - B
SR 1000	650 (19.69")	1920 (75.57")	1812 (73.07")	320 (12.57")	3150 (124.01")	8550 (336.61")
					4250 (167.32")	9650 (379.92")
					5750 (226.37")	11150 (438.98")
					8250 (324.80")	13650 (537.40")
					10250 (403.54")	15650 (616.14")
					12250 (482.28")	17650 (694.88")

	A	C	D	E	L	L - B
SR 1250	650 (25.6")	2150 (84.6")	2.23 (7.4")	320 (12.6")	4250 (167.32")	9650 (379.92")
					5750 (226.37")	11150 (438.98")
					8250 (324.80")	13650 (537.40")
					10250 (403.54")	15650 (616.14")
					12250 (482.28")	17650 (694.88")



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SPECIFICATION

Type		SR 1000		SR 1250	
Working Range:					
Swing over bed	mm	1000	3 3"	1250	4 1"
Swing over carriage	mm	710	2 4"	900	2 11"
Height of centers above bed	mm	500	1 8	630	2 1
Distance between centers to be specified in order	mm	3000 to 12000		9 10" to 39 4"	
Maximum weight of workpiece without rests	tons	9 to 10		13 to 14	
Output of main motor	kW	34		34	
Maximum torque on face plate a 11.2 r. p. m. of spindle	mkg	2500	18500 ft lbs	3150	22800 ft lb
Headstock:					
Spindle speeds arranged in 36 steps.					
No. I Range	r. p. m.	18 to 90		14 to 71	
No. II Range	r. p. m.	8 to 400		6.3 to 315	
Taper in front end of spindle		No. 6 Morse		Metric 80	
Diameter of spindle in front bearing	mm	200	7 7/8"	240	9 7/16"
Diameter of face plate	mm	1000	3 3"	1250	4 1"
Carriage:					
Longitudinal feeds arranged in 36 steps:					
No. I Range – 18 rates of feed at all spindle speeds mm per rev		0.125 to 6	0.005" to 0.24" per rev		
No. II Range – 18 rates of feed at lower range of spindle speeds mm per rev.		1 to 48	0.04" to 1.92" per rev		
Cross feeds and tool slide feeds are equal to 0.4 x longitudinal feeds					
Cross section of tool for standard tool post	mm	70×70	2 3/4" × 2 3/4"		
Cross section of tool for four-way tool post	mm	48×48	1 7/8" × 1 7/8"		
Longitudinal rapid traverse mm per min.		3600	11'10" per min.		
Screwcutting by means of lead screw:					
Thread of lead screw	threads per inch	2			
29 metric threads, pitch	mm	1 to 50			
33 Whitworth threads	threads per inch	24 to 1/2			
11 module threads, module		2 to 5			
21 diametral pitch threads	D. P.	1 to 10			
32 circular pitch threads	C. P.	2 to 1/1			
Ratio, standard to steep thread		1 8			
Screwcutting by means of pinion and rack.					
29 metric threads, pitch	mm	1 to 50			
26 module threads, module		2 to 20			
Tailstock:					
Diameter of tailstock sleeve		140	5 1/2"	160	6 9/16"
Taper in tailstock sleeve		No. 6 Morse		Metric 80	
Steady Rest:					
Clear diameter	mm	500	1 8"	630	2 1"
Drive:					
Main motor output	kW	34			
speed	r. p. m.	1440			
Motor for rapid traverse of carriage slide, output	kW	1.3			
speed	r. p. m.	2880			
Motor for lubricating oil pump output	kW	0.185			
speed	r. p. m.	2800			
Weights and Dimensions:					
Distance between centers (basic)	mm	3000		9 10	
Overall length of machine, approx.	mm	6560	21'4"	6700	22'0"
Weight of machine with standard equipment	kg	13335	29400 lbs	kg 14960	32980 lbs
A 1000 mm (39") increase of center-to center distance increases weight approx by	kg	635	1400 lbs	kg 780	1720 lbs

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

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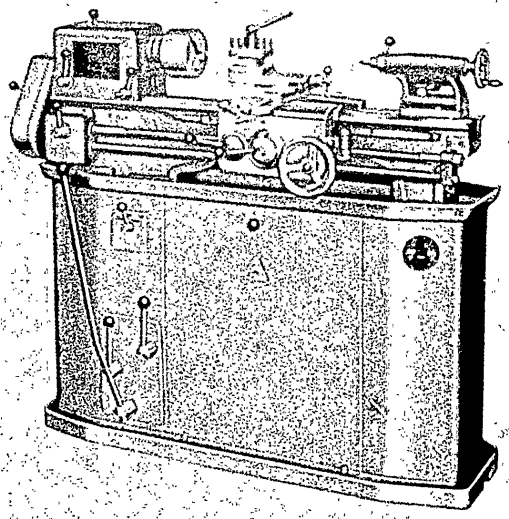

CENTRE LATHE Model JSO 5

This machine is intended for the precision machining of smaller parts.

THE SPINDLE is hardened and ground and runs in adjustable plain bearings.

THE GEARBOX is located in the left-hand part of the column. Two levers serve for changing 10 spindle speeds arranged in geometrical progression. The gearbox is fitted with a double-type multiple disc clutch. The accelerated rapid return means a considerable saving of time when threading.

THE FEEDBOX allows for an unusually rapid feed selection in the ratio of 1 : 2, 1 : 4 or 2 : 1, 4 : 1, without any necessity of disturbing the set change gears.

THE CARRIAGE rides on long V-guideways provided with wipers to protect the bed from chips. The swivel tool-block may be secured in 8 positions.

THE APRON is fitted with a thread indicator.

THE BED having ground trapezoidal slideways is firmly connected with both cabinet legs and the base to form with them a compact unit. A tool box is provided in the central part of the column to keep in tools and equipment

STANDARD EQUIPMENT: 2 lathe centres Morse No 2, 1 reducing sleeve, 1 four-way tool block revolving, 18 change gears, 1 set of spanners, 1 grease gun, 1 instruction booklet, 1 nameplate.

OPTIONAL EQUIPMENT: 1 catch plate, 1 face plate, 1 follow rest, 1 steady rest, cooling equipment with electric pump, 1 backplate for universal chuck Ø 115, 1 backplate for universal chuck Ø 140, collet chuck attachment with 1 set of collets from 2 – 15 mm, 1 tool box, 1 universal chuck Ø 115 mm, 1 universal chuck Ø 140, 1 hand support, 1 extension for drill chuck 0 – 13 mm, 1 extension drill chuck 3 – 16 mm.

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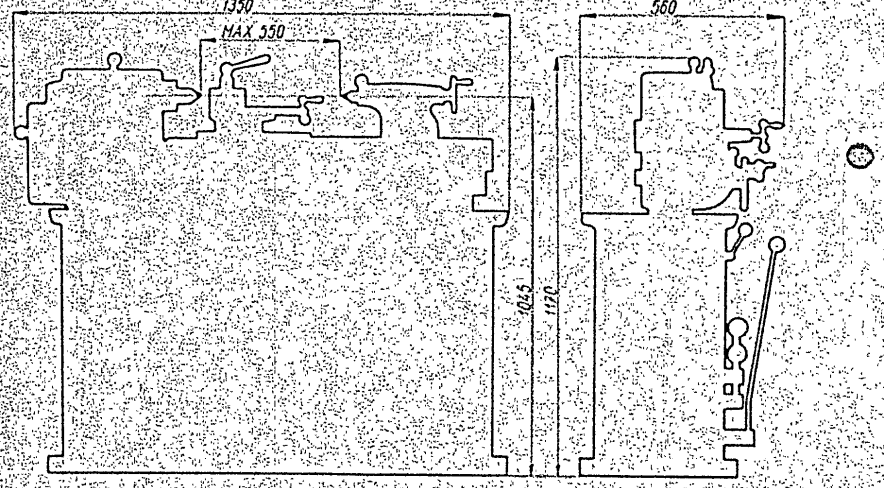
SPECIFICATIONS:

		Metric	English
Swing over bed	mm	225	8 3/4"
Swing over carriage	mm	135	5 1/4"
Distance between centres	mm	550	21 2/3"
Width of bed	mm	172	6 3/4"
Bore of spindle	mm	25.5	1"
Taper in spindle	Morse	4	4
Taper of centres	Morse	2	2
Thread on spindle nose		M 45 × 4.5	M 45 × 4.5
Spindle speeds. Number		10	10
Range:	r. p. m.	36–2100	36–2100
Acceleration of rapid return motion		1.5 ×	1.5 ×
Feeds: Range of longitudinal feeds	mm/rev.	0.017 – 2.2	70–150 cuts per inch
Range of cross feeds	mm/rev.	0.009 – 0.7	36–282 cuts per inch
Threads: 24 metric threads, pitch	mm	0.25 – 6	
24 Whit worth threads, pitch	t. p. i.		4 – 72
14 module threads, module		0.25 – 3.5	0.25 – 3.5
Diameter of lead screw	mm	25	0.97"
Pitch of lead screw	t. p. i.	4	4
Output of motor	r. p. m. 1400 kW	0.75 or 1.1	0.75 – 1.1
Floor space required	mm	650 × 1350	25 1/2" × 53"
Weight of machine: with standard equipment	kg	440	lbs 970
packed for rail	kg	490	lbs 1008
packed for overseas	kg	590	lbs 1300
Box measurements	cm	145 × 80 × 140	57" × 31½" × 55"

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!



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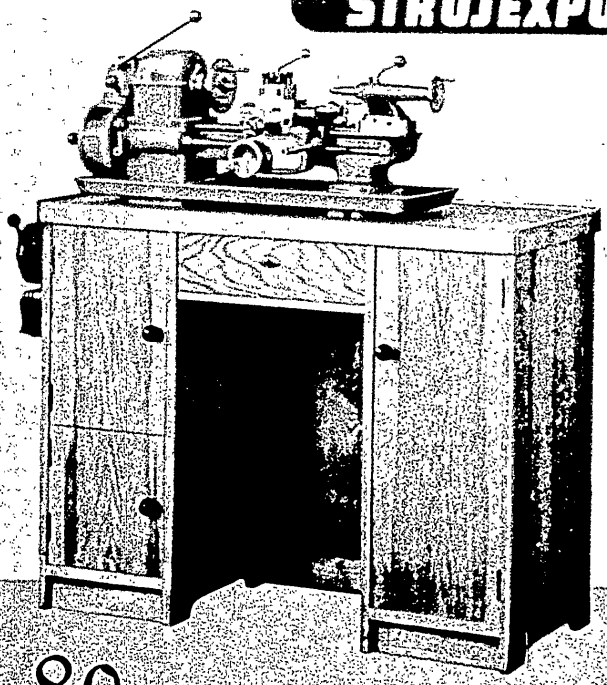

MN-80 VOLMAN - BENCH CENTRE LATHE

Precision Centre Lathe for machining parts of all metals and plastics. It is especially well-suited for the branch of precision mechanics.

THE WORK SPINDLE is mounted in adjustable plain bearings and driven by an electric motor. Starting, stopping and reversing of this motor is done by a pole-changing switch. Six spindle speeds are obtained by a double-geared swivelling countershaft and three-step pulleys with V-belts. The lead screw is driven by change gears from the work spindle through a planetary gear which reduces the adjusted pitch of thread to a fine feed in relation of 1 : 20.

THE CARRIAGE consists of a longitudinal and cross slide rest and of a swivelling tool slide. One lever operates the four-way tool block. The motion screws are provided with indexing rings. The screw nuts are adjustable to eliminate backlash.

THE TAILSTOCK has V-guides and is fixed by an eccentric with the aid of a hand lever. A metric scale serves for accurate feeding of the centre sleeve when drilling. The indexing ring of the motion screw for the centre sleeve movement is fitted with a scale for accurate setting of the drilling depth.

THE BED has flat guides. The play in the front guide-way is eliminated by a taper gib.

THE BENCH. The machine rests on a wooden bench containing the electric motor with countershaft. The change gears and equipment can be kept in the bench drawers.

STANDARD EQUIPMENT. Electric motor with countershaft and pole changing switch, collet chuck attachment for clamping while cutting including 1 collet according to wish, chip pan, catch plate, 2 lathe centres, back-plate for scroll chuck, reducing sleeve, set of change gears, set of spanners, wooden bench, operating instruction booklet.

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

TOS

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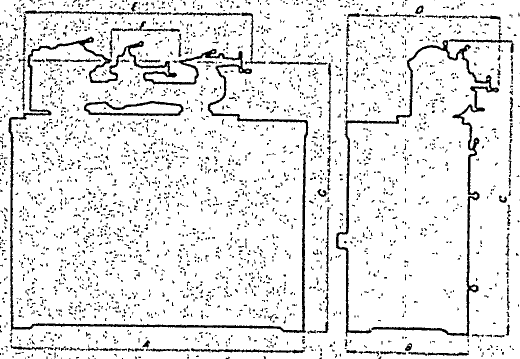
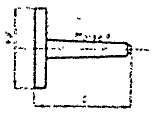
SPECIFICATIONS:

Swing over bed	mm	160	6 1/4"
Distance between centres	mm	350	9 31/32"
Swing over carriage	mm	90	3 1/2"
Width of bed	mm	120	4 3/4"
Diameter of face plate	mm	150	5 7/8"
Bore of spindle	mm	18	0.7"
Taper of centres	Morse	1	1
6 spindle speeds ranging from	r. p. m.	160—1600	160—1600
Feeds:			
20 longitudinal feeds	mm/rev.	0.01—0,15	
Cuts per inch			170—2540
Pitch of lead screw	mm	3	
Threads:			
20 metric threads, pitch	mm	0.2—3	
Main drive motor:			
speed	r. p. m.	1400	1400
output	HP	0,35	0,35
Weight of machine:			
with standard equipment	kg	175	386 lbs.
packed for rail	kg	250	550 lbs.
packed for overseas	kg	320	705 lbs.
Floor space required	mm	500×1150	19 3/4"×45 1/2"
Contents boxed	m³	1,2	42 cu. ft.

ADDITIONAL EQUIPMENT:

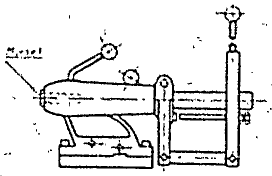
Half-centre, hollow centre, hollow half-centre, three-jaw chuck up to dia. 6 mm, collets, step chucks, ring chucks, polishing plate for emery cloth, tailstock rest plate, face plate with 4 reversible swivelling jaws, scroll chuck with 2" × 3 jaws, lever type drill tailstock, folding hand rest, indexing attachment for the work spindle, rise and fall rest with clamping angle iron, steady rest, follow rest, indexing attachment for the compound rest.



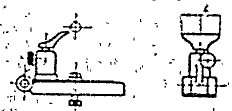


Tailstock rest plate

L 70 2.76"
O d 80 3.15"

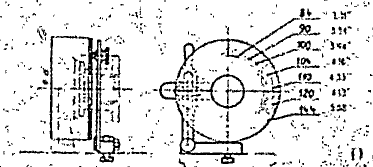


Lever type drill tailstock



Folding hand rest

L 40—80 1.57" 15"

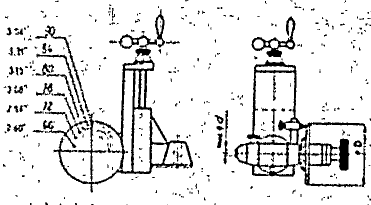


Indexing attachment for the work spindle

O d 130 5.1"

Rise and fall rest with angle plate

a 60 2.36"
b 15 0.59"
c 9 0.35"
d 8 0.315"
e 7 0.276"



Indexing attachment for the compound slide rest

O d 10 0.39"
O D 90 3.54"

		A	B	C	D	E	F	G
mm		1150	500	1200	570	850	250	1100
		45,4"	19,7"	47,5"	22,4"	33,4"	9,8"	43,2"

As improvements in design are continually being made, all above data are not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

STROJEXPORT

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ČSN 350003 9 - 1958

Printed in Czechoslovakia

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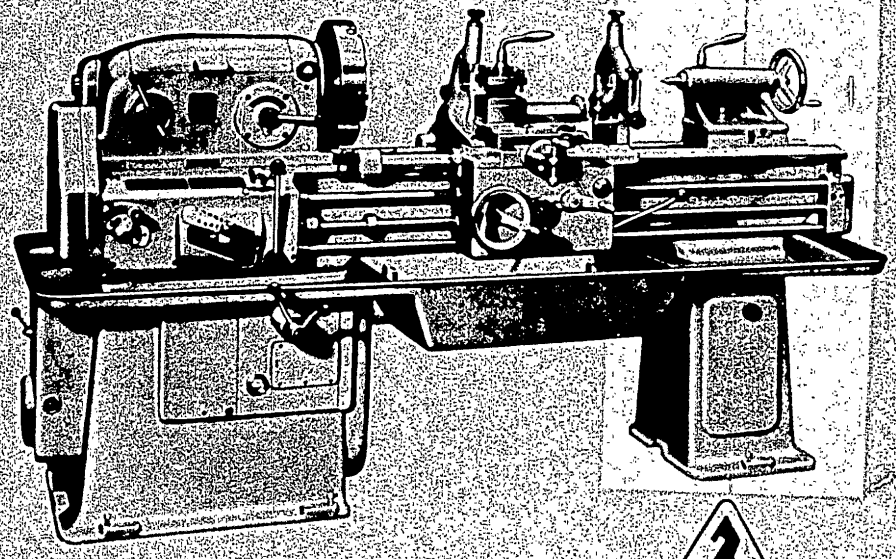
UNIVERSAL CENTER LATHES

type

SN20

Type SN 20 Universal Center Lathes are intended for all common turning operations. They are particularly useful for work requiring a high dimensional accuracy and a high grade of surface finish of the parts being machined. Their outstanding feature is economy in the machining of all kinds of metals both in the single part and quantity production.



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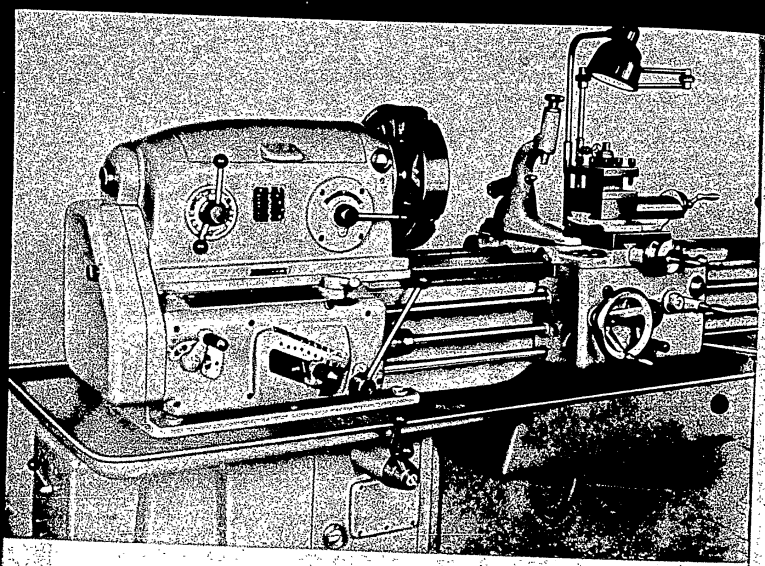


DESCRIPTION

The Headstock is of sturdy construction with smooth and pleasing lines. The spindle runs in substantial bearings and is relieved of the pull of the belt. By this arrangement vibrations are eliminated and one of the main conditions for obtaining smoothly machined surfaces is satisfied. The spindle is hardened and ground. Thrusts are taken up by an anti-friction bearing. The front end of the spindle is designed in accordance with standard specifications and permits the face plate and driver plate or the self-centering chuck to be exchanged quickly. The gears are hardened and ground. They slide on hardened and ground multi-splined shafts.

The Speed Change is effected by three levers, one of which is arranged at the right-hand side of the headstock and two on the gear box. The speeds and positions are indicated by an operating plate in the centre of the headstock. The lever at the right-hand side of the headstock controls the 1 : 1, 1 : 8 back gears. The feeds are reversed and 8 : 1 gear for the cutting of steep threads engaged by means of two levers arranged also on the headstock. The headstock gears and spindle bearings are lubricated by an independent gear pump in the front leg of the machine. The movement of the spindle is transmitted through a reversing clutch and change gears to the feed and thread box.

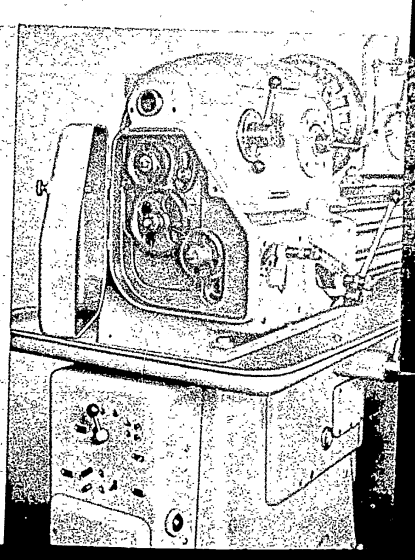
The Feed and Thread Box affords 27 longitudinal feeds and 27 cross feeds. This number can further be increased by means of change gears. The gears are changed by means of gear change levers as well as by changing the gears on the gear quadrant. The method of selecting the speeds and feeds for screwcutting is clearly shown by operating plates. The reversing and stopping lever and the lever for screwcutting and turning are fitted conveniently on the headstock. The lead screw is manufactured with the greatest care and has an accurate pitch measured by special measuring instruments. It serves for screwcutting only. Gears for 27 Whitworth threads may be set by means of the gear levers alone and 9 more by means of change gears. Gears for 27 metric threads may be set by means of change gears alone. The same number of coarse threads in the ratio of 8 : 1 is made available by operating the appropriate lever on the headstock. 5 additional change gears are supplied against extra charge to give 34 module threads with modules ranging from 0,25 to 5. The feed shaft has a stop for disengaging the longitudinal power feed and an adjustable safety clutch for protection against overload.

The Gear-Box is conveniently designed and fitted in the box shaped left-hand side leg. It has four speeds which are changed by two concentrically fitted levers. A multi-plate clutch of generous proportions permits quick and smooth stopping and reversing. A low specific pressure and high grade of material increase its reliability and prolong its life. The clutch is easily accessible and adjustable. The sliding gears of the gear box are hardened and lubricated by an oil spray. They slide on ground multisplined shafts.

The Carriage. The longitudinal slide has long guiding surfaces scraped to fit accurately to the bed ways and protected by wipers. It is made of special cast iron, sturdily built and forms the guide-ways for the cross slide. The rotating part may be set at any angle and forms a broad base for the tool slide with the revolving four-way tool block which is locked in eight accurate positions.

The driving screw of the cross slide is made to fit into the nut without backlash. The dividing rings have a large diameter so that the dials are easy to read and permit the tool to be accurately set. The longitudinal slide is locked on the bed for the turning of faces.

Adjustable stops for the longitudinal and cross feeds may be supplied on special request.



Feed change gears

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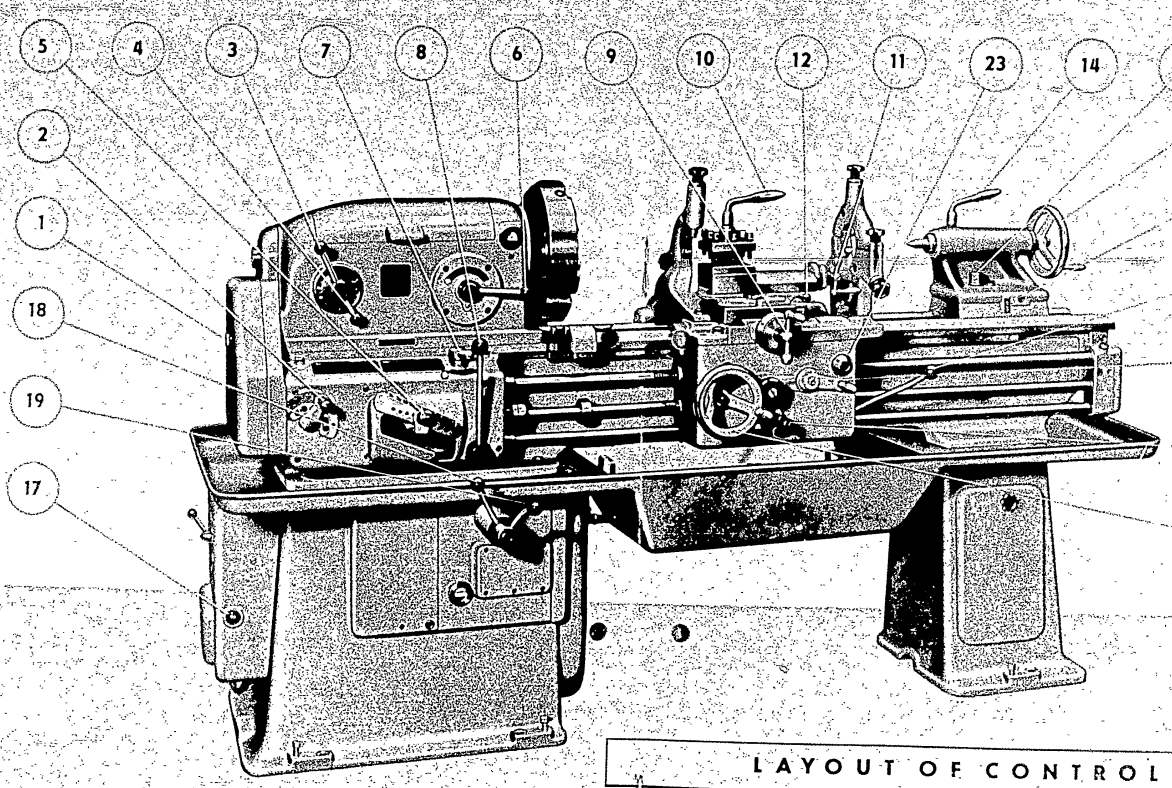

LAYOUT OF CONTROLS

1. Knob for opening the change gear compartment.
2. Lever for engaging the back gears of feed and thread box.
3. Lever for starting, stopping and reversing the carriage feed.
4. Lever for standard and coarse threads.
5. Feed change lever.
6. Speed change lever (engagement of headstock back gears).
7. Lever for engagement of drive of lead screw or drawing spindle.
8. Starting lever — reversing of machine.
9. Crank for cross slide travel.
10. Handle for loosening and locking the four-way tool block and tool.
11. Crank for travel of tool slide.
12. Carriage locking lever.
13. Nut for securing the tailstock.
14. Tailstock sleeve locking lever.
15. Screw for accurate setting of tailstock.
16. Handwheel for movement of tailstock sleeve.
17. Signal light.
18. Speed change lever.
19. Speed change lever.
20. Handwheel for longitudinal carriage feed.
21. Power feed engaging lever (for longitudinal and cross feed).
22. Clasp nut control lever.
23. Thread indicator.
24. Starting lever — reversing of machine.

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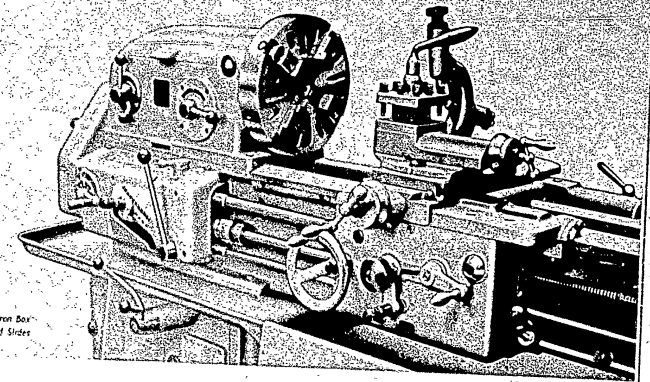
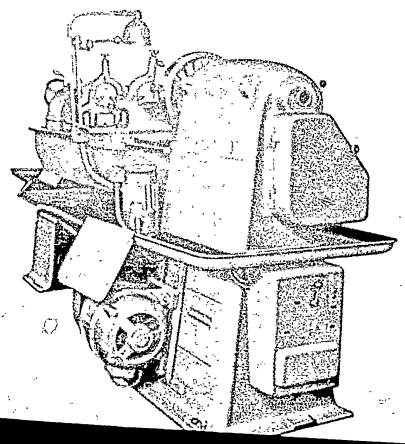


Apron Box and Slides

The Apron Box and the longitudinal slide are combined into a solid unit. Here the principle of simple operation was satisfied by a clear layout of controls. The carriage is moved by hand by means of a handwheel on the apron box and the longitudinal or cross power feed is engaged by tightening the clutch knob and shifting the appropriate lever. The lever at the right-hand side of the apron box serves for engaging the split clasp nut. The movement of the lever is interlocked with the change of the power feeds. A lever controlling the multi-plate clutch of the gearbox serving for starting and reversing the machine is conveniently fitted at the operator's right. The thread indicator is fitted directly in the apron box. All gears are centrally lubricated, the worm and worm gear run in an oil bath.



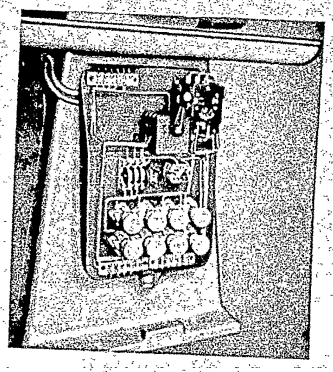
The Tailstock is of sturdy construction. The tailstock sleeve is hardened and accurately fitted. The tailstock can be moved quickly along the bed. It may also be moved on its base for the turning of steep tapers.

The Electrical Equipment is housed in a cabinet of its own fitted at the left of the outer side of the front leg and is easily accessible.

The Coolant is supplied by an electrically driven centrifugal pump arranged at the rear of the chip pan through a pipeline with joints directly to the tool. The coolant tank is at the bottom of the chip pan.

Standard Equipment:

340 mm diameter jaw type face plate, 190 mm diameter driver plate with pin, 2 centers (spindle and tailstock) with No. 3 Morse taper, No. 3/5 Morse taper reducing sleeve, steady rest, follow rest, revolving four-way tool block, 12 change gears with 40, 45, 45, 50, 55, 65, 65, 70, 75, 80, 90, 127 teeth, back plate for 200 mm diameter self-centering chuck, 11 spanners, 2 bars for adjustment of spindle bearings, screw-driver, oil can, board for spanners inside the rear machine leg, operating instruction booklet.



Electrical Equipment

Special Equipment:

Electrical equipment without motors or lighting, lighting, main motor, 3 kW, 1400 r. p. m., electric motor driven coolant pump 0,125 kW, 2750 r. p. m., coolant pipeline and fittings, self-centering 3-jaw chuck, live-center with No 3 Morse taper, taper turning attachment and copying attachment, change gears for module threads with 35, 42, 60, 97, 126 teeth, adjustable stops for longitudinal feed, adjustable stops for cross feed, elongated cross slide with T-slots (used only without the copying attachment), 350 mm diameter face plate (heavy type), measuring-tool pan.

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SPECIFICATION

Principal Dimensions:			
Height of centers above flat guideway	mm	200	7 1/16"
Height of centers above V-guideway	mm	152	7 3/4"
Distance between centers	mm	1000 or 1500	39" or 59"
Maximum swing over bed	mm	400	15 7/16"
Maximum swing over carriage	mm	240	9 7/16"
Diameter of face plate	mm	340	13 1/16"
Diameter and length of front spindle bearing	mm	70×110	2 3/4"×4 11/32"
Bore of spindle	mm	40	1 9/16"
Taper in spindle			No. 5 Morse
Thread at end of spindle according to DIN specification No. 80			Metric 68
Taper in tailstock sleeve			No. 3 Morse
Width of bed	mm	300	12"
Spindle Speeds:			
Number of spindle speed in either direction			8
Range of spindle speeds	r. p. m		32 to 1000
Feeds:			
(without using change gears)			
Number of longitudinal feeds			27
Range of longitudinal feeds	mm/rev.		0,08 to 0,64
Range of longitudinal feeds	inches/rev.		0,0032 to 0,0256
Number of cross feeds			27
Range of cross feeds	mm/rev.		0,026 to 0,21
Range of cross feeds	inches/rev.		0,00104 to 0,0084
Threads:			
27 metric threads, pitch (excluding coarse threads)	mm		0,25 to 7,5
36 Whitworth threads per inch (excluding coarse threads)			4 to 60
34 module threads, module			0,25 to 5
Ratio, standard to coarse thread			1 : 8
Diameter of lead screw	mm		32
Pitch of lead screw	per inch		4
Drive:			
Main motor 1400 r. p. m.	kW		3
Coolant pump motor 2750 r. p. m.	kW		0,125
Dimensions and Weights:			
Distance between centers	mm	1000	1500
Floor space required		40"	60"
	mm	2320×1015	2820—1015
Weight with standard equipment and motors, approx.		7'7"×3'4"	9'3"×3'4"
	kg	1260	1360
Weight of railway packing, approx.	lbs	2780	3000
	kg	195	230
Weight of seaworthy packing, approx.	lbs	430	510
	kg	250	380
	lbs	550	840
Dimensions of case	metres	2,62×1,27×1,52	3,12×1,27×1,52
	feet	106"×50"×60"	143"×50"×60"
Volume of seaworthy packing	cu. metres	5,00	5,80
	cu. feet	178	205

Lathes with a distance between centers of 750 mm can only be supplied if a larger number of machines is ordered.
Lathes with a distance between centers of 1000 and 1500 mm (39" or 59") can also be supplied with a bed gap which, of course, reduces the rigidity of the bed although the bed is fully reinforced at the point of the gap. The size of the gap is 95×270 mm (3 3/4"×10 5/8") for a 1000 mm lathe and 95×350 mm (3 3/4"×13 3/4") for a 1500 mm lathe

Important! Do not forget to specify the voltage and phase of power supply in your order. - It is recommended to order the special equipment simultaneously with the machine, otherwise delivery with the machine cannot be guaranteed.

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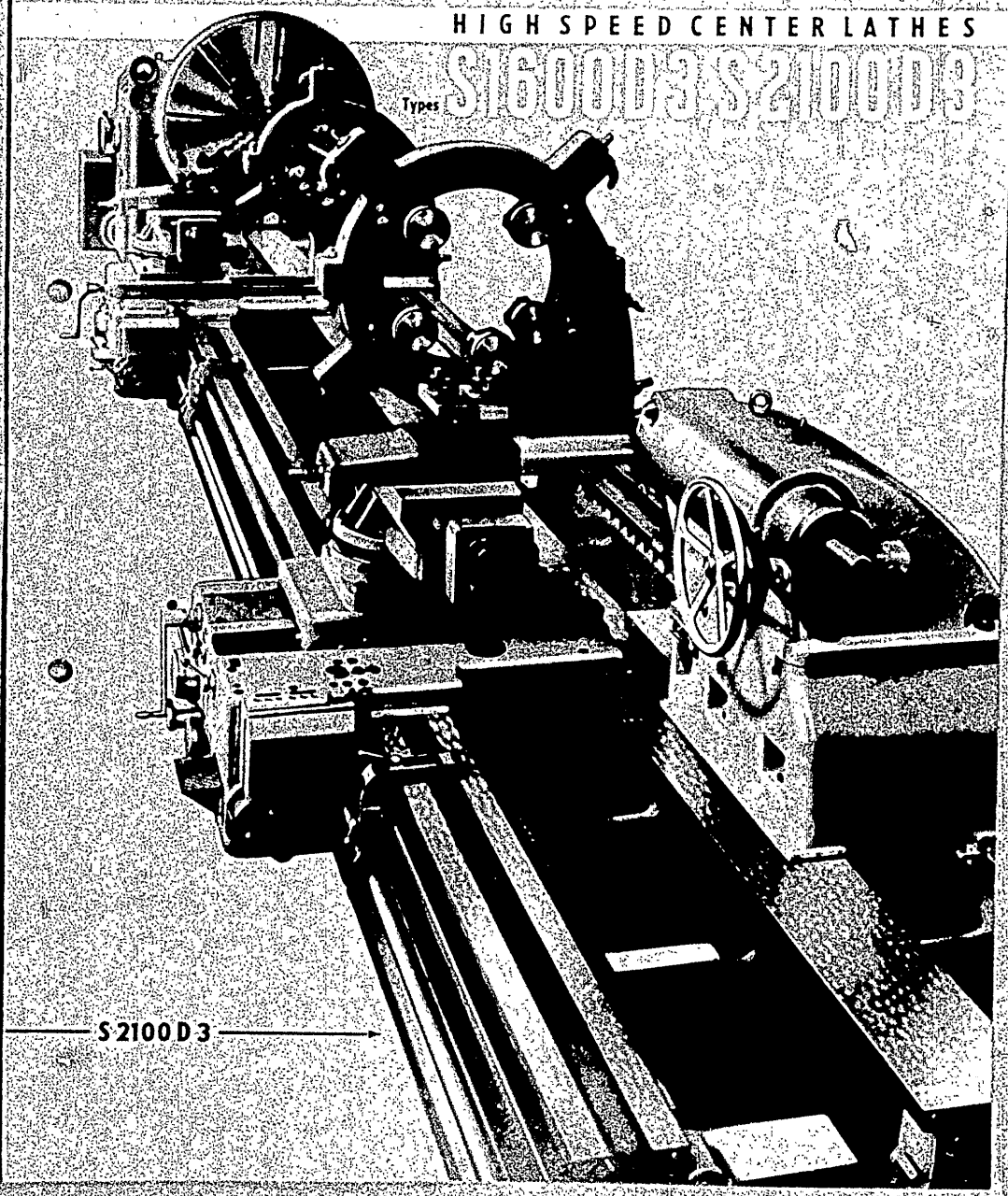
ŠKODA

HIGH SPEED CENTER LATHES

Types S 1600 D 3, S 2100 D 3



S 2100 D 3

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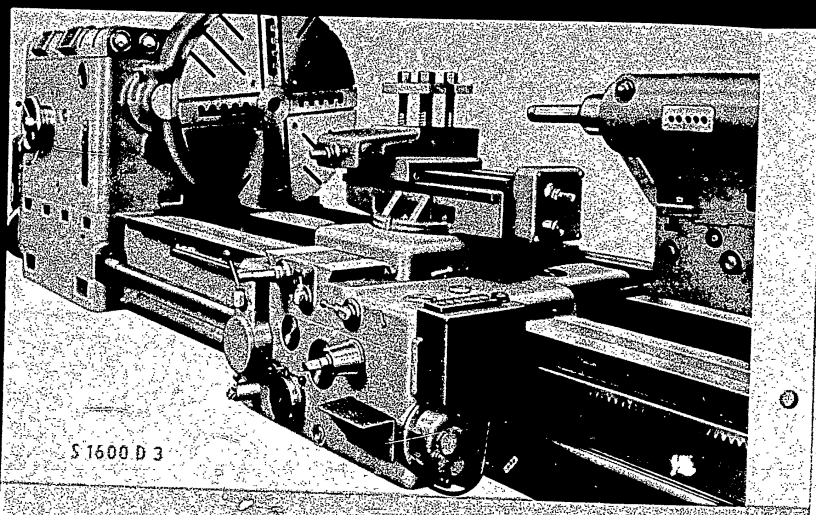

CENTER LATHES

S 1600 D 3 S 2100 D 3

... for very heavy turning work. Both are designed on the same basic lines. They are ... of spindle speeds and feeds arranged in fine steps and can therefore be used to ... with sintered carbide tipped tools as well as for work with wide tools and tools of special ... steel or high speed steel.

... FEATURES ARE:

- High power main drive motor
- High spindle speeds with a wide range (1 : 200)
- Large number of feed rates arranged in fine steps
- High rigidity of design
- Easy and quick control of machine from operator's post
- Screwcutting on entire turning length
- High-grade material and workmanship of statically and dynamically stressed parts

LUBRICATION. The headstock and carriage are centrally lubricated. An oil strainer accessible from outside and a lubrication guard with a light signal equipment are fitted into the lubrication circuit of the headstock. When the headstock lubrication does not operate a red light burns and the main motor cannot be started. When the lubrication fails in the course of operation the main motor stops automatically.

CONTROL. The machine is remote-controlled by push-buttons and can be controlled from the headstock as well as from the individual carriages. The clearly laid out hand wheels for the changing of spindle speeds and levers, arranged directly on the individual carriages, for the changing of rates of feed contribute to the easy, convenient and simple operation of the machine.

STANDARD EQUIPMENT

- 1 face plate 1580 mm (5'2") diameter with 4 jaws, pressed on to spindle (for Type S 1600 D3)
- 1 face plate 2000 mm (6'6") diameter with 4 jaws, pressed on to spindle (for Type S 2100 D3)
- 1 fixed steady 800 mm (2'7") diameter (for Type S 1600 D3)
- 1 fixed steady 1000 mm (3'3") diameter (for Type S 2100 D3)
- 2 centers with 90° point and Metric 100 taper
- 1 set of change gears for screwcutting
- 1 gear-type oil pump
- 1 lamination type oil strainer
- 1 set of spanners, cranks, operating plates and tables, operator's instruction booklet

ELECTRICAL EQUIPMENT

- 1 main motor with starting clutch
- 1 motor for rapid traverse of carriage on bed
- 1 motor for rapid movement of tailstock on bed
- 1 motor for rapid movement of tailstock sleeve
- 1 motor for drive of lubricating pump
- 1 contactor box with appropriate contactors and protective equipment
- 1 lubrication guard with signal lights
- 1 ammeter
- 1 tachometer
- push-buttons for remote control of ... on headstock, carriage slide and ...
- 1 spot light with plug

SPECIAL EQUIPMENT

Type	S 1600 D3	S 2100 D3
Additional carriage with complete electrical equipment, approx.	kg 4550 (10030 lbs)	kg 5140 (11340 lbs)
A second carriage can be fitted to machines with a length between centers of 8000 mm (26'3") or more		
Additional fixed steady. 800 mm (2'7") dia. approx.	kg 1575 (3470 lbs)	
Additional fixed steady 1000 mm (3'3") dia. approx.		kg 2200 (4850 lbs)
Fixed steady 600 mm (1'11") dia. approx.		kg 1350 (2980 lbs)
Attachment for turning tapers on entire turning length (up to maximum length of 7500 mm or (24'7") with change gears for 1 : 50 and more slender tapers, approx.	kg 10 (22 lbs)	
Tailstock sleeve with live center fitted, approx.	kg 365 (805 lbs)	

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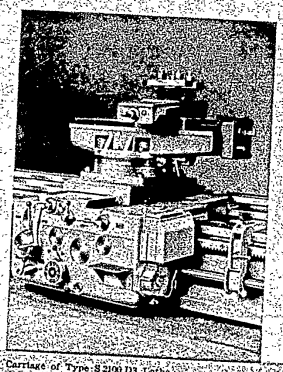
DESCRIPTION.

THE DRIVE. The machine is driven by a three-phase squirrel cage motor through a starting clutch set for the shortest starting period, forward and reverse, and equipped with an automatic, adjustable, electro-magnetically controlled brake for quick stopping of the drive. The motor is controlled by push-buttons arranged on the headstock and on the individual carriages. The inching of the spindle is controlled by a push-button on the headstock. When it is operated the brake is simultaneously released.

THE BED is wide and reinforced with ribs. It has large passages for the chips which are guided into baskets in a channel under the machine. Due to this arrangement the work on the machine need not be stopped to remove the chips. The bed has 3 flat guideways permitting the carriages to move freely past the steadies and tailstock over their entire length of travel.

THE HEADSTOCK. The power is transmitted from the electric motor through the starting clutch and sliding gears directly to the sturdy cast steel face plate with a gear rim. The face plate is pressed on to the end of the spindle. The gears are made of special steel and have hardened and, wherever necessary, ground teeth. All layshafts run in anti-friction bearings.

THE SPINDLE. The two radial bearings of the spindle have divided [illegible] bearing shells. The thrust in either direction is taken up by [illegible] bearings. No gears are keyed to the spindle so that its movement is absolutely smooth.



Carriage of Type S 2100 D3 Lathe

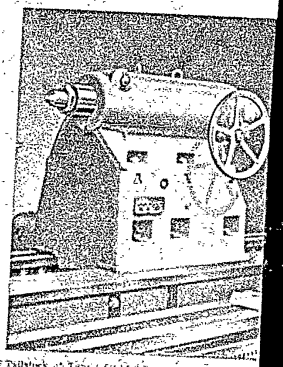
THE CARRIAGES are provided with their own feed boxes and motors for rapid traverse. The longitudinal and cross feeds are engaged by multi-plate clutches which, at the same time, act as safety clutches so that the feeds may be changed at will, even while the tool is in the cut. When the power feed is disengaged, which is done by a single lever, the various movements can immediately be operated by hand. The rapid traverse may be engaged in either direction even while the working feed is engaged. Each carriage can be equipped for screw-cutting on the entire turning length. The carriage is guided on the front guideway and on one half of the centre guideway and clears the steadies as well as the tailstock.

THE TAILSTOCK is provided with a motor for the rapid movement on the bed and a motor for the movement of the tailstock sleeve. The fine movement of the sleeve is operated by hand. The hand and power movement of the tailstock sleeve are mutually independent.

The standard sleeve can be replaced by a sleeve with a live center which is available as special equipment.

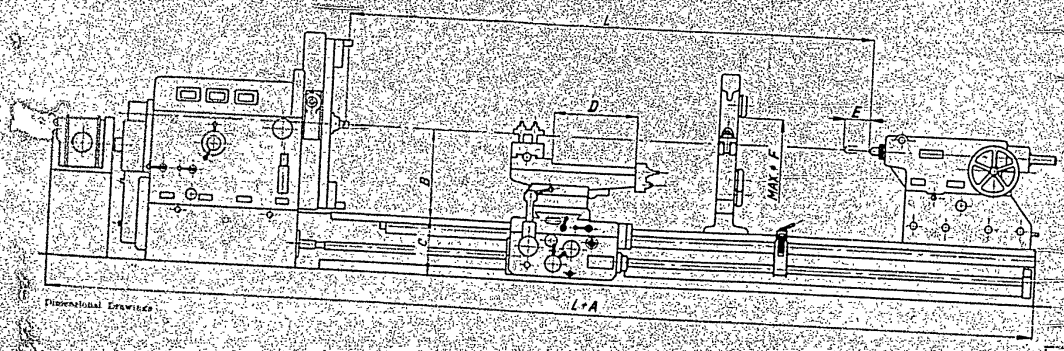
THE STEADIES are of the two-part type, enclosed. The steady for the maximum diameter has five jaws, the one for smaller diameters 4 jaws. The jaws are either fitted with sliding shoes or with rollers. The rollers run in large anti-friction bearings and their surface has a glass-like hardness.

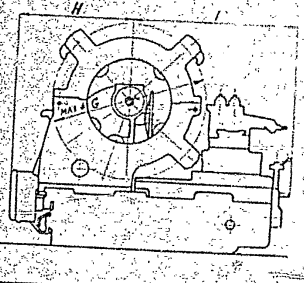
SCREWCUTTING. Metric and Whitworth threads with current pitches can be cut on the machine on the entire turning length. The screwcutting is done by a lead screw with an independent drive. The pitch of the thread is set by means of change gears. For very coarse threads up to a pitch of 400 mm or 16" the machine is provided with a speed raising gear with an 8 : 1 ratio.



Tailstock of Type [illegible]

THE TAPER-TURNING ATTACHMENT is supplied for the machine as special equipment. It permits tapers to be turned on the entire length between centers. The taper is set by means of change gears the ratio of which links the rate of the longitudinal carriage feed to the rate of the longitudinal feed of the swivelled top slide. The top slide is accurately set by means of a template.





	A	B	C	D	L	F	G	H	J
S 1600 D 3	5105	800	680	600	300	800	1260	1215	1850
S 2100 D 3	5700	1050	680	1000	300	1000	1700	1325	1920

Dimensional Drawings

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Specification

		S 1600 D3			S 2100 D3	
Type						
WORKING RANGE						
Maximum swing over bed	mm	1600	5' 3"	mm	2080	6' 9¼"
over carriage	mm	1200	3' 11"	mm	1700	5' 6¼"
Height of centers above bed	mm	800	2' 7½"	mm	1050	3' 5"
Distance, center to center	metres	6, 8, 10, 12		19' 8", 26' 3", 32' 9", 39' 4"		
Maximum weight of workpiece between centers (without steadies)	kg	28000			61700 lbs	
Maximum torque on face plate	cmkg	70000			56000 ft. lbs	
HEADSTOCK						
Spindle speeds arranged in 24 steps	r. p. m.	0.71 to 140			0.45 to 90	
Taper in front end of spindle			Metric 100			
Diameter of spindle in front bearing	mm		315		123⁹/₆₄"	
Diameter of face plate	mm	1550	5' 2"	mm	2000	6' 6"
CARRIAGE						
32 longitudinal feeds arranged in 2 ranges:						
1st range — 16 feeds at all spindle speeds	mm per rev.	0.15 to 5.6		0.007" to 0.112" per rev.		
2nd range — 16 feeds at lower spindle speeds	mm per rev.	1.4 to 45		0.056" to 1.8" per rev.		
32 cross feeds	mm per rev.	0.07 to 18		0.003" to 0.72" per rev.		
Rapid traverse	mm per min.	3000		10" per min.		
SCREWCUTTING BY MEANS OF CHANGE GEARS						
Pitch of leadscrew	t. p. i.		2			
55 metric threads, pitch	mm		1 to 50			
55 Whitworth threads	t. p. i.		24 to ½			
Steep threads, pitch			8 times normal			
Number of change gears			19			
TAILSTOCK						
Diameter of tailstock sleeve	mm		200		7⅞"	
Taper in tailstock sleeve			Metric 100			
Rapid movement on bed	mm per min.		2500		8' 2" per min.	
Rapid movement of tailstock sleeve	mm per min.		1480		4' 10" per min.	
FIXED STEADY						
Maximum clear diameter	mm	600	2' 7½"	mm	1000	3' 3"
DRIVE						
Main motor:						
output	kW		56			
speed	r. p. m.		960			
Motor for rapid traverse of carriage:						
output	kW		2.5			
speed	r. p. m.		1420			
Motor for rapid movement of tailstock on bed:						
output	kW		1.6			
speed	r. p. m.		1420			
Motor for rapid movement of tailstock sleeve:						
output	kW		0.5			
speed	r. p. m.		2770			
WEIGHTS AND DIMENSIONS						
Weight of machine with one complete carriage and standard equipment:						
for 6000 mm (19' 8") between centres, approx.	kg	44500	98100 lbs	kg	48500	106900 lbs
for 8000 mm (26' 3") between centres, approx.	kg	48500	106900 lbs	kg	53000	116900 lbs
for 10000 mm (32' 9") between centres, approx.	kg	52500	115800 lbs	kg	57500	126800 lbs
for 12000 mm (39' 4") between centres, approx.	kg	56500	124600 lbs	kg	62000	136700 lbs
Distance, centre to centre, minimum	mm		6000		19' 8"	
Overall length of machine						
for 6000 mm (19' 8") between centres, approx.	mm	11400	37' 5"	mm	11800	38' 9"
for 8000 mm (26' 3") between centres, approx.	mm	13400	44'	mm	13800	45' 3"
for 10000 mm (32' 9") between centres, approx.	mm	15400	50' 6"	mm	15800	51' 10"
for 12000 mm (39' 4") between centres, approx.	mm	17400	57' 2"	mm	17800	58' 5"
for 16000 mm (52' 6") between centres, approx.	mm	21400	70' 4"	mm	21800	71' 8"

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS!

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

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COK 53561/a - 54/3

Printed in Czechoslovakia

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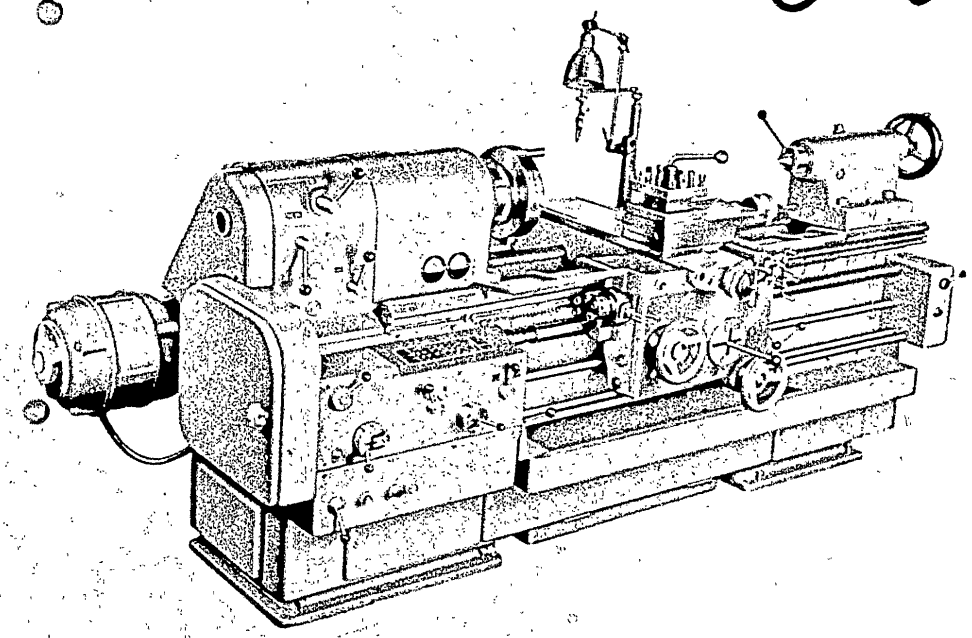
NEW CENTRE LATHES 50



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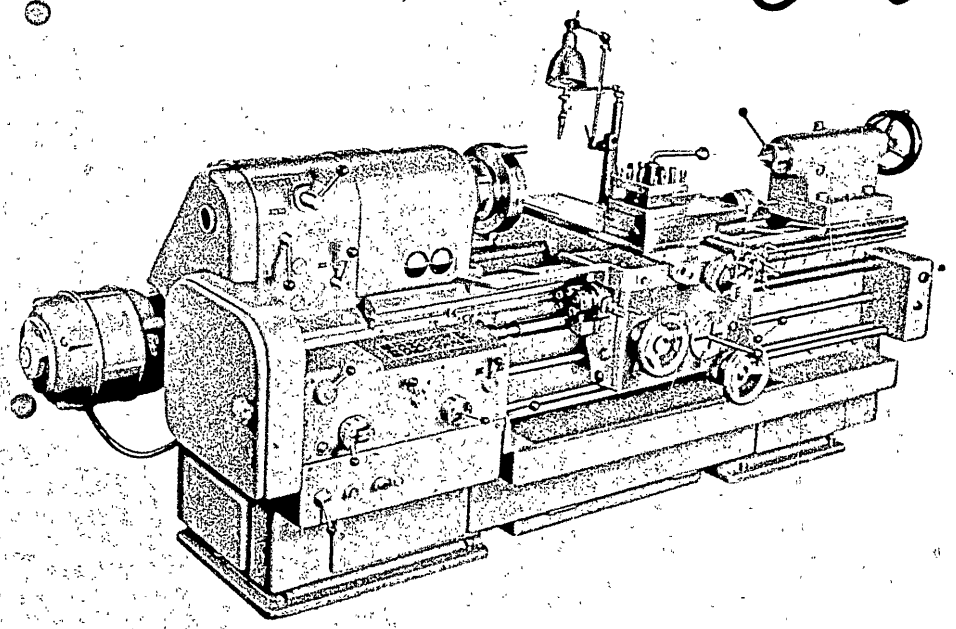

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THE CENTRE LATHES MODELS SU 50 AND SS 50

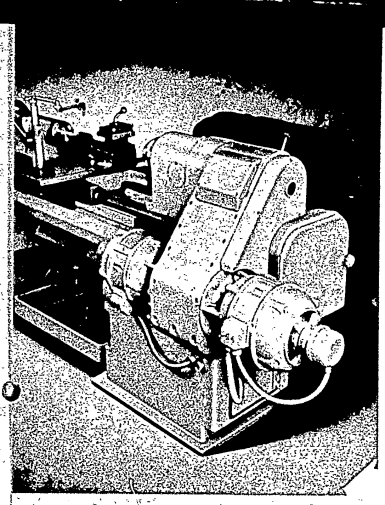
are built in two types:

1. UNIVERSAL LATHES MODEL SU 50
   for the single part production
2. PRODUCTION LATHES MODEL SS 50
   for the quantity production

In developing these machines our designers have always borne in mind to give them the following main features:
Increased efficiency of the machine and economical production.
Improved quality of products and enduring accuracy.
Ease of control and the non-productive time reduced to a minimum.

INCREASED EFFICIENCY AND ECONOMY OF PRODUCTION

1. The work spindle of the Universal Type has a wide speed range (11.2 to 1400 r. p. m.) which makes possible use of carbide tipped tools and cutting of threads of large diameters with an adequately low speed.
2. With the Universal Type (SU 50) the output of the main drive motor is 15 HP, with the Production Type (SS 50) it is 30 HP.
3. The bed has the section of an enclosed girder and its rigidity is several times higher as compared with that of the previous types This feature enables an easy removal of a large quantity of chips from the machine whereby the heating of the bed is eliminated.
4. The rigidity of the work spindle has been increased by the new and improved way of the spindle mounting. The improved spindle mounting has been obtained by the optimum distance between the bearings at a given spindle diameter and by the spindle drive through a clutch, so that the spindle is not distorted by the bending stress resulting from the driving mechanism.
5. High rigidity of the headstock box is obtained by separate mounting of the headstock and gearbox.
6. Increased rigidity of the machine makes possible turning at a maximum torque of 31000 kgcm and producing a pressure of 1600 kg at the longitudinal feed.
7. The use of the tandem system of 2 driving motors facilitates frequent starting, stopping and reversing of the work spindle without employment of the multiplate clutches. By the series and parallel connection of motors any impulses of current are eliminated, and the starting torque equals the nominal torque.
8. The work spindle nose is arranged as a long external taper to ensure the clamping of a gripping fixture without any play.



TANDEM DRIVE OF MACHINE

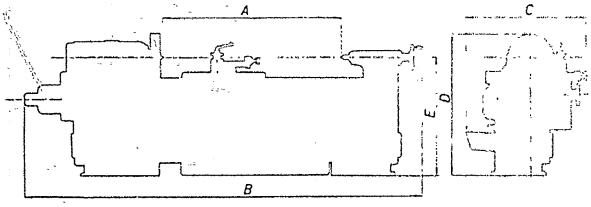
STANDARD EQUIPMENT:

Catch plate, backplate for chuck dia. 260 mm, four-way swivel tool block, 2 dead centres Morse No 5, reducing sleeve for the spindle M 60/Morse 5, cooling attachment with coolant pump, spot light without bulb, stop system including 12 stops, grease gun, V-belts for the rapid traverse motor, electrical equipment including electric motor for 380 volts, set of spanners, operating instruction booklet

OPTIONAL EQUIPMENT:

Face plate, steady rest up to 140 mm dia., follow rest up to 140 mm dia., chip guard, rear multiple tool block, catch plate with scale, steady rest up to 250 mm dia., special tool block, taper turning attachment, backplate for chuck dia. 260 mm, backplate for dia. 320 mm, tailstock reducing sleeve Morse No 5.

DIMENSIONAL DRAWING



Model	SU 50				SS 50			
Distances between centres	750	1000	1500	2000	750	1000	1500	2000
A mm	800	1100	1600	2100	800	1100	1600	2100
B mm	3475	3775	4275	4775	3475	3775	4275	4775
C mm	1180	1180	1180	1180	1180	1180	1180	1180
D mm	1390	1390	1390	1390	1390	1390	1340	1390
E mm	1140	1140	1140	1140	1140	1140	1140	1140

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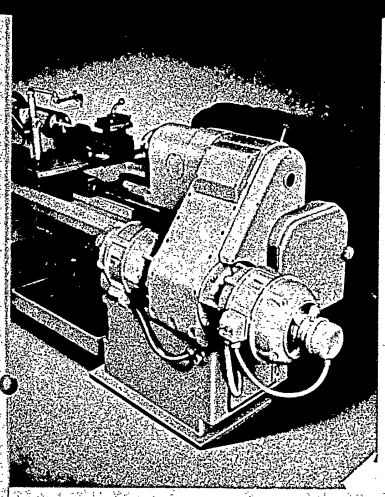

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OPTIONAL EQUIPMENT:

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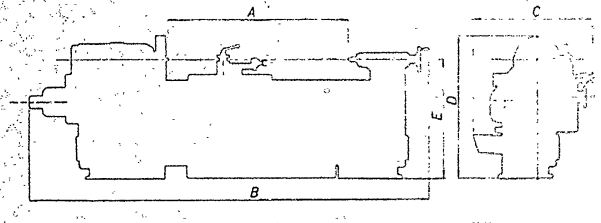

Model	SU 50				SS 50			
Distances between centres	750	1000	1500	2000	750	1000	1500	2000
A mm	800	1100	1600	2100	800	1100	1600	2100
B mm	3475	3775	4275	4775	3475	3775	4275	4775
C mm	1180	1180	1180	1180	1180	1180	1180	1180
D mm	1390	1390	1390	1390	1390	1390	1390	1390
E mm	1140	1140	1140	1140	1140	1140	1140	1140

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IMPROVED QUALITY OF PRODUCTS AND ENDURING ACCURACY

1. Increased rigidity of headstock, tailstock, carriage and bed.
2. Elimination of thermal distortions of the headstock and of vibrations of the machine by separate mounting of the work spindle drive and of the headstock box.
3. Vibrationfree work at a minimum play, enabled by the spindle mounting in adjustable anti-friction bearings.
4. Accurate adjustment to the dimensions of the workpiece facilitated by a relieved system of stops.
5. Increased accuracy of the longitudinal tool slide feed obtained due to the prismatic tool slide-ways.
6. The tool slide-ways are arranged as hardened steel gibs and ensure enduring accuracy of the machine (supplied at an extra charge).
7. The swivel tool post is fixed in position so that no play can arise.
8. The bed and carriage guides are protected by guards against the entrance of impurities and chips.
9. The drill is clamped in a special sleeve secured against rotation when drilling with the tailstock centre sleeve so that the taper bore is protected from damage.
10. All bearings have automatic lubrication the function of which may be easily checked.

EASE OF CONTROL AND THE NON-PRODUCTIVE TIME CUT TO A MINIMUM

1. Starting, stopping and reversing of the work spindle is effected by a handlever for controlling the electric switches.
2. A part of the work spindle speeds (8 in number) is changed from the apron box.
3. Changing of speeds is facilitated by a jog button device.
4. The selection of the feed direction and of the rapid traverse of the carriage in all directions is done by a single directional lever.
5. An individual electric motor started by a push button from the operator's position serves for engaging the rapid traverse of the carriage.
6. For repeated operations both in the longitudinal and cross direction any number of positive stops can be used to enable the machining of stepped and intricate parts without measuring.
7. All controls are operated with a minimum of effort
8. The carriage can be equipped with a tool post with quickly interchangeable tool holders which are adjustable for heights.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

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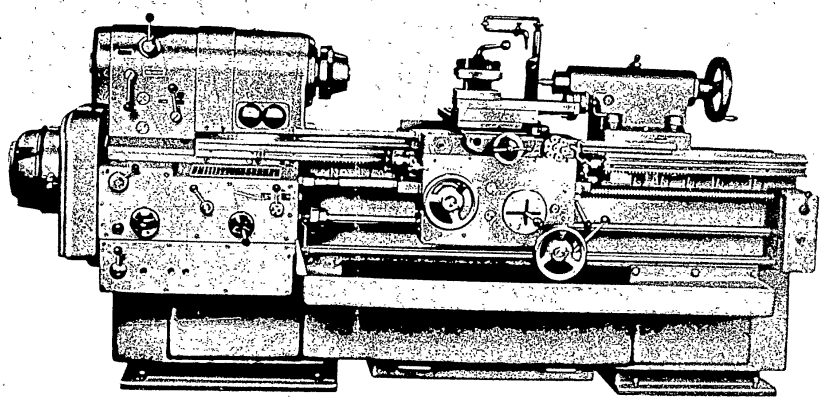

1. Main switch of the electric current
2. Pilot bulb of the main switch
3. Oil level gauge of the gear and of the thread boxes
4. Lever for changing the 8 rates of threads
5. Lever for changing the metric and Whitworth threads
6. Signal bulb for the parallel connection of motors
7. Push button for jogging and braking the spindle
8. Lever for changing the standard and coarse threads
9. Lever for changing the metric and Whitworth threads
10. Lever for engaging the tripple geared shaft
11. Lever for changing the right and lefthand thread
12. Lever for changing feeds and threads at the ratio of 1 : 1, 1 : 2, 1 : 4, 1 : 8
13. Oil level gauge
14. Wattmeter for the main drive motors
15. Longitudinal stop
16. Lever for engaging the drawbar and the lead screw
17. Oil filling hole
18. Lever for operating the drum length stop
19. Push button for engaging the rapid traverse
20. Oil level gauge for the apron box
21. Hand wheel for the longitudinal feed
22. Hand wheel for the cross feed
23. Lever for operating the drum cross stop
24. Lever for locking the tailstock centre sleeve
25. Directional lever for changing the longitudinal and cross feeds
26. Lever for changing the 8 spindle speed rates
27. Indexing ring
28. Lever for engaging the clasp nut
29. Lever for starting and braking the motors
30. Push button for jogging the motors
31. Lever for starting the coolant pump
32. Pilot bulb for the coolant pump

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SPECIFICATIONS:

		SU 50	SS 50		SU 50	SS 50
Swing over bed	mm	500		ins	19 7	
Swing over carriage	mm	250		ins.	9.8	
Swing in gap	mm	—				
Swing in steady rest	mm	25—140—250		ins	1—5.5—9.8	
Swing in follow rest	mm	25—140	10—140	ins.	1—5.5	0 4—5.5
Distance between centres	mm	750, 1000, 1500, 2000		ins.	29 6, 39 4, 59, 78.7	
Distance between centres (with taper bar)	mm	350		ins	13.8	
Bore of spindle	mm	56		ins	2.2	
Taper in spindle		M 60, 1 : 20				
Taper of centres		Morse 5				
Spindle nose	mm	120, 1 . 4×75				
Width of bed	mm	420		Int.	16.5	
Diameter of face plate	mm	500		ins	19.7	
Diameter of catch plate	mm	265		ins.	10.4	
Diameter of chuck	mm	240		ins.	9.4	
Dimensions of 4-way tool post	mm	160×160		ins	6.3×6.3	
Maximum cross section of cutting tool	mm	32×32		ins.	1 25×1 25	
Diameter of tailstock centre sleeve	mm	100		ins	3.94	
Stroke of tailstock centre sleeve	mm	224		ins.	8.8	
Taper in tailstock centre sleeve		Morse 5				
Maximum weight of machined workpiece	kg	1100		lbs	2420	
Spindle speeds: Number		22	21			
Range	r. p. m.	11,2—1400	22.4—2240			
Coefficient of spindle speed graduation		1.25				
Feeds: Number		48	15			
Longitudinal feeds ranging from	mm/rev.	0.027—3.8	0.04—1.75 cuts p. inch		6.7—940	14.5—635
Cross feeds ranging from	mm/rev.	0.013—1.9	0.02—0.88 cuts p. inch.		13.4—1950	29—1270
Pitch of lead screw	mm	50×12			—	
Threads: 36 Metric, pitch	mm	0.5—36				
46 Whitworth		$^{7}/_{8}$"—72				
28 Module		0.5—18				
40 Diametral pitch		$1^{3}/_{8}$—72				
Main drive motors. Number		2				
Speed	r. p. m.	1400	2800			
Output	HP	2×7.5—15	2×15—30			
Coolant pump motor: Speed	r. p. m.	2800	2800			
Output	HP	0.24				
Rapid traverse motor: Speed	r. p. m.	2800				
Output	HP	0 9				
Maximum torque on spindle	kg/cm	31000		lbs ins	27000	
Pressure on cutting tool	kg	4000		lbs	8800	
Pressure on longitudinal carriage feed	kg	1600		lbs	3520	
Distance between centres	mm	1000		Ins.	39 4	
Floor space required (width×length)	mm	1180×3775		ins	46.5×147	
Weight of machine with standard equipment	kg	2800		lbs	6200	

As improvements in design are being made continually this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

STROJEXPORT

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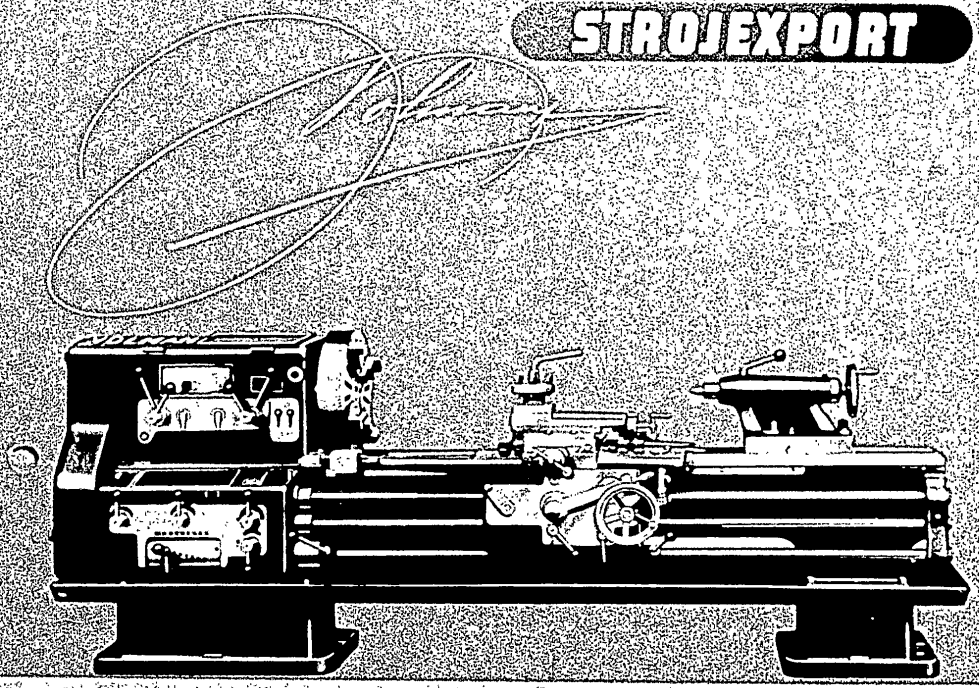

CENTRE LATHE Type L 27

The machine is intended for all current turning operations and can be used to advantage for individual manufacture as well as for repetition work.

The design of the machine incorporates all basic features of a modern lathe. Precision manufacture and the use of high grade materials complete the technical perfection of the machine from the point of view of performance as well as precision and reliability in service.

Outstanding Features

- ★ Wide range of spindle speeds.
- ★ Possibility of cutting metric, Whitworth, module and diametral pitch threads.
- ★ Possibility of cutting steep threads.
- ★ Accurate disengagement of longitudinal feed of carriage.
- ★ Bed gap with removable bridge.

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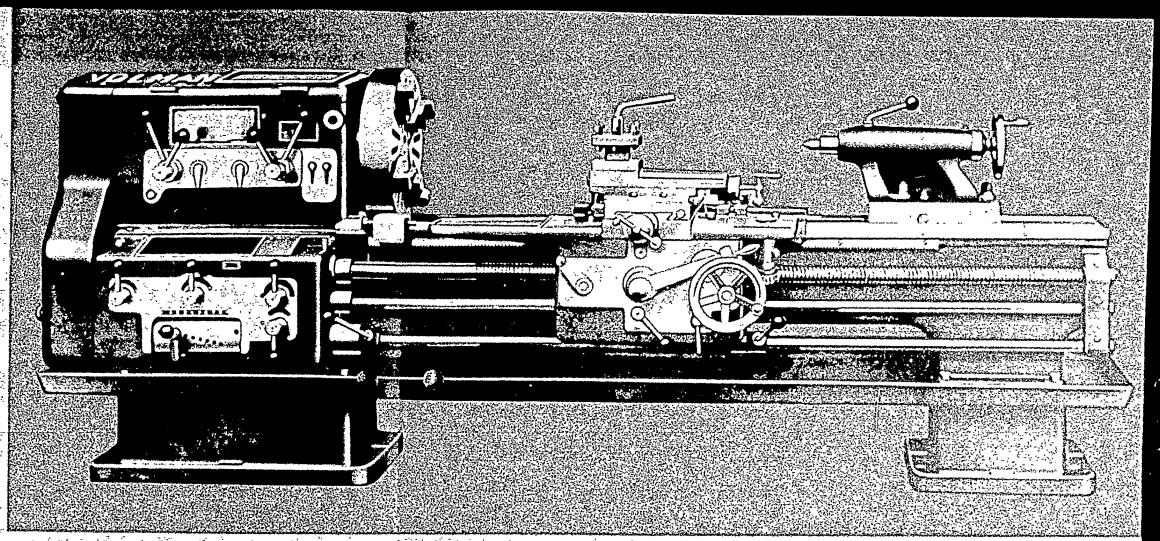
L 27



Description

The headstock spindle runs in front in an adjustable plain bearing. The layshafts of the sliding gears have a six spline cross section and run in antifriction bearings.

The spindle is started by a reversing double multiplate clutch which is easy to adjust for various outputs. This clutch also protects the machine from overload. When the clutch is disengaged the spindle is stopped automatically by a brake connected with the multi-plate clutch. All rotating parts of the headstock run in an oil bath.

In the headstock 18 forward speeds of the spindle are arranged and 18 increased reverse speeds. These speeds can be further increased by using a two-speed motor which is supplied on request.

While a speed is engaged only the gears which transmit power are in mesh.

The headstock also contains the gears necessary for cutting steep threads or for high rates of feed. These threads have a pitch four times or sixteen times as high as the pitch engaged in the quick-change gear box. In addition to that a reversing gear for cutting right and left hand threads is fitted in the headstock.

All gears in the headstock are made of hardened and tempered steel and the teeth are shaped on precision machines. The same can, if required, be supplied with the gears hardened and ground which are particularly recommended for the machine with the increased range of spindle speeds.

The quick-change gear box is of the universal type and permits all current metric, module, Whitworth and DP threads to be cut. The machine is normally supplied with a lead screw with inch pitch. This design proves especially suitable as not only threads with extremely coarse pitch can be cut but it allows also the change gears to be in direct contact with the lead screw when cutting abnormal threads.

The quick-change gear box has its own central lubricating system. The apron box is fitted with an arrangement which permits the longitudinal feed to be disengaged with high precision by positive stops.

A valuable supplement of the arrangement for disengagement by positive stops is the stop drum which permits automatic turning against positive stops in either direction. The drum has four slots and permits several stops to be set in one slot behind each other or, if necessary, slip gauges to be used.

The feeds are engaged in steps by a friction clutch. The longitudinal and cross feeds are reversed by means of a reversing gear controlled by a lever. The prevention of simultaneous engagement of the clasp nut and feeds is ensured by mutual interlocking.

The carriages are of generous dimensions and the wide guideways are accurately scraped.

The swivelling cross slide has an angular scale and carries the four-way tool post with catches for eight individual positions.

The lower, sliding part of the cross slide can, on request, be extended and fitted with a rear tool post.

The machine is driven by a standard feet mounted electric motor fitted at the rear of the bed on a universal base. The mounting rails, which can be moved crosswise, permit a motor of different origin to be fitted as well. The machine is driven from the motor by means of V-belts.

Standard Equipment (included in price of machine)

1 self-centering chuck with 4 reversible jaws
1 driver plate
1 steady and 1 follow rest
1 thread indicator
1 cooling equipment with pump
1 chip pan
1 four-way tool post
2 dead centers with reducing sleeve for spindle head
1 flange for fitting of universal scroll chuck
1 three-phase electric motor, 380 Volts, 50 cycles, 1400 r. p. m., 7.5 HP with base and mounting rails including V-belt pulley and V-belts, guard and cam-type switch
1 set of change gears
indicating plates
1 operating instructions

Optional Equipment and Design (supplied against extra charge)

Length stop drum
Extended cross slide with rear tool post
Taper bar
Design of headstock with all gears hardened and ground
Two-speed electric motor 1400/2800 r. p. m. with cam-type switch instead of standard motor (only when all gears are ordered hardened and ground)
Single-pulley drive with plain pulley (price of motor will be deducted)

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SPECIFICATION

Swing over bed	mm	500	21.6"
Swing over gap	mm	850	33.4"
Swing over carriage	mm	350	13.7"
Width of bed gap in front of face plate	mm	250	9.13/16"
Width of bed	mm	400	15.3/4"
Maximum diameter of turning in steady	mm	150	5.7/8"
Diameter of face plate	mm	500	19.3/4"

HEADSTOCK

Number of main spindle speeds		16	
Standard range of spindle speed	r. p. m.	9.5 to 480	
Increased range provided 1400/2800 r. p. m. motor and all hardened and ground headstock gears are supplied	r. p. m.	9.5 to 1000	
Taper in main spindle 1:20, diameter	mm	65	
Taper of centers		No. 4 Morse	
Diameter of bore of main spindle	mm	60	2.23/64"

UNIVERSAL QUICK CHANGE GEAR BOX

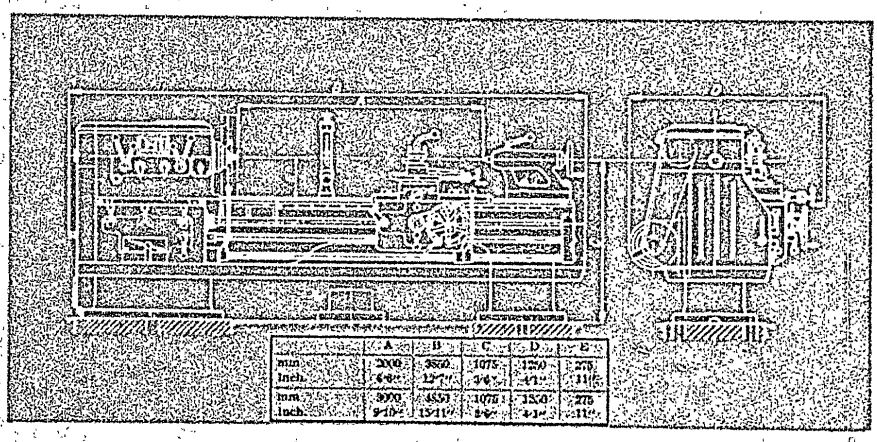
Number of longitudinal and cross feeds		72	
Range of longitudinal feeds per rev.	mm	0.03 to 8.3	0.0012" to 0.33"
Range of cross feeds per rev.	mm	0.01 to 2.8	0.0004" to 0.11"
Threads which can be cut 55 metric	mm	1 to 224	
72 Whitworth	t. p. i.	1/8 to 30	
46 module	module	0.25 to 56	
58 diametral pitch	D. P.	0.5 to 120	
Diameter and pitch of lead screw	mm	55 × 1/2"	
Output of motor, 1400 r. p. m.	HP	7.5	
Output of motor, 1400/2800 r. p. m.	HP	7.5/10	

LINE SHAFT DRIVE

Diameter and width of driving pulley	mm	220/105	8.3/4"/4.3/16"
Speed of driving pulley per standard range of headstock spindle speeds	r. p. m.	720	
Weight of machine, turning length 2000 mm (6'6")	kg	2800	6170 lbs
Weight of machine, turning length 3000 mm (9'10")	kg	2980	6570 lbs

The machines are continuously being improved upon. The particulars given in this prospectus are therefore not binding in detail

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS!



	A	B	C	D	E
mm	2000	3850	1075	1250	275
inch	6'6"	12'7"	3'6"	4'1"	11"
mm	3000	4850	1075	1250	275
inch	9'10"	15'11"	3'6"	4'1"	11"

STROJEXPORT

PRAHA — CZECHOSLOVAKIA

COK 520593 a - 5507 - Svět 06 571-55

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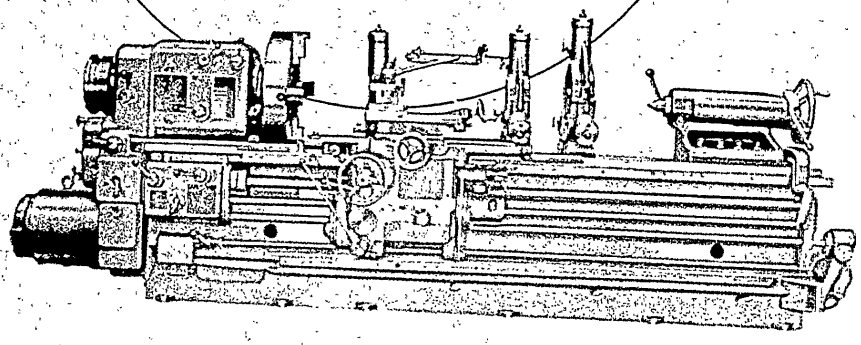
NEW CENTRE LATHES

Type

SU 63 SS

TOS



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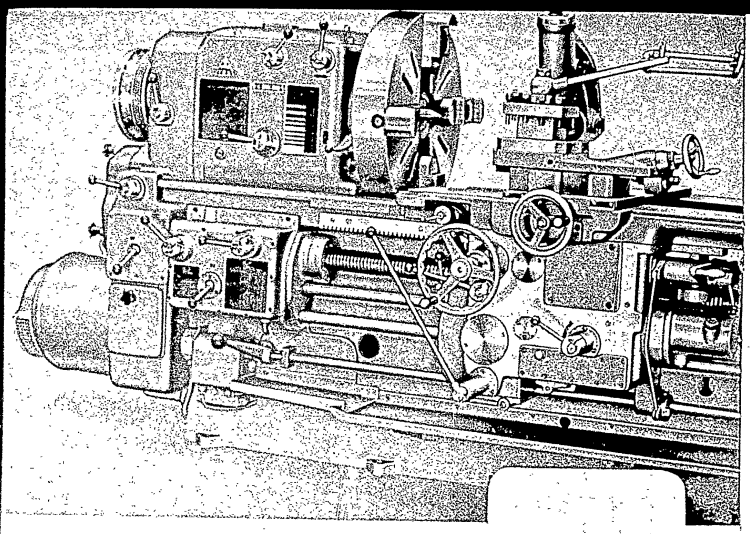


63

NEW CENTRE LATHES TYPE

These machines are manufactured in two designs:

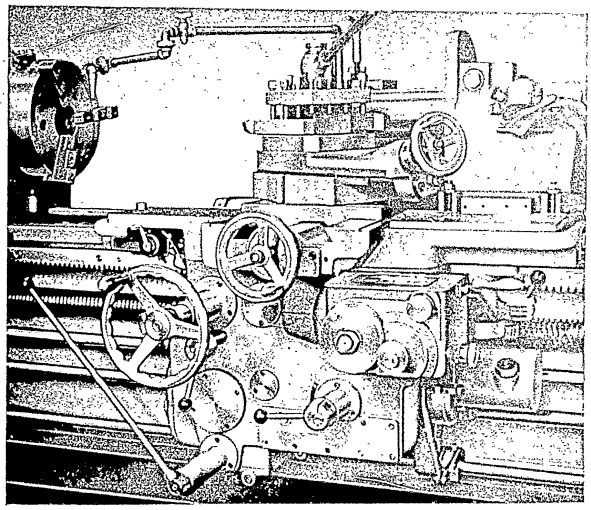
THE TYPE SU 63 UNIVERSAL CENTRE LATHE is intended for accurate machining operations using one or more tools and is particularly suitable for the single part production of non-uniform parts. It is equipped for the cutting of all kinds of threads in a wide range of pitches. The threads can be rough cut by means of the carriage feed driven off a rack and pinion. This saves the leadscrew which is only used for the accurate finishing of threads. The attachments and instruments supplied as special equipment make this machine universal and increase its range of application to all turning operations

THE TYPE SS 63 PRODUCTION CENTRE LATHE is intended for single purpose work in large quantities Various methods of turning are enabled by a range of attachments supplied as special equipment. Threads can also be cut on the machine within certain limits.
Both designs are marked by a wide range of spindle speeds, a high capacity and high precision and afford economic utilization of cemented carbide tipped tools or tools with a negative rake at high cutting speeds.

STROJEXPORT

DESCRIPTION

THE HEADSTOCK is formed by a rigid, completely enclosed box which reduces vibrations to a minimum even at maximum load of the machine
The main spindle is driven by a two-speed pole-changing A. C. squirrel cage induction motor through a twelve-step gear box with three pairs of change gears giving five different ranges of basic speeds of the main spindle.
Precision machining is ensured by the sturdy system of bearings of the main spindle comprising adjustable double-row anti-friction bearings and by the dynamic balance of rotating parts
The direction of rotation of the spindle is reversed by reversing the main drive motor. This applies to normal turning as well as to screwcutting.
Two multi-plate clutches in the gear box serve for engaging and disengaging the gears and are controlled by a hydraulic cylinder acting through the centre of the hollow shaft
Two efficient shoe brakes are provided for quickly stopping the main spindle and for quickly changing its speeds. One of them acts upon the lower countershaft near the main motor, the other directly upon the main spindle.
The front end of the spindle is provided with an ISA taper. It affords an easy exchange of chucks and prevents them from working themselves loose when reversing the spindle rotation



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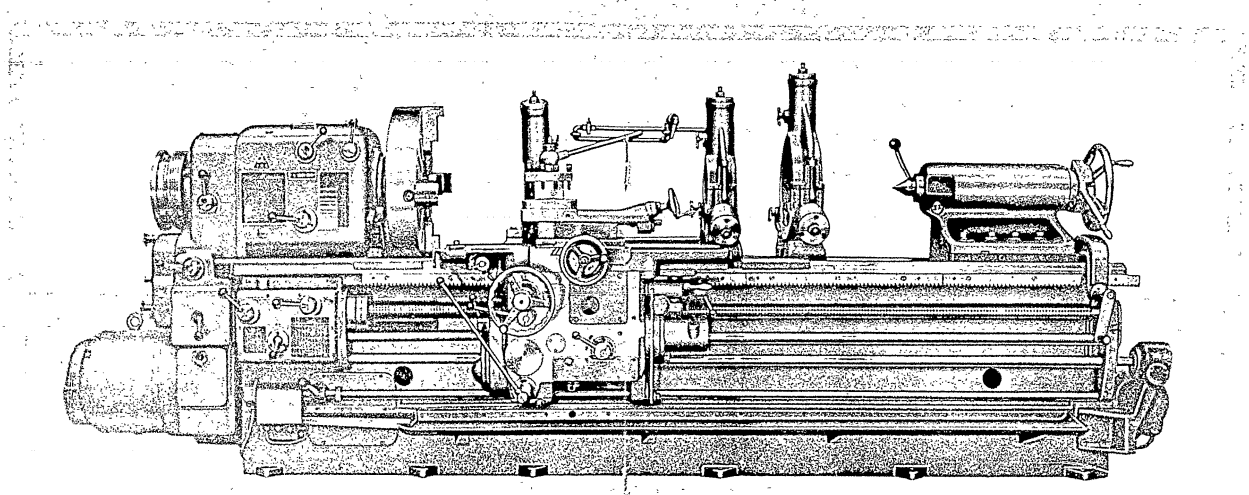

THREADING BOX. The type SU 63 universal lathes are equipped with a large threading box designed for the cutting of metric, Whitworth, module, diametral pitch and circular pitch threads in a wide range. Each kind of thread is covered by a single setting of change gears. The screwcutting box is sealed air-tight and has no slot for the tumbler lever.
The type SS 63 production lathes have only a small screwcutting box and no lead screw. Threads can only be cut in a limited range with pitches corresponding to the feeds

THE CARRIAGE moves on the wide bed-ways The longitudinal and cross feeds are effected by hand as well as by power. The tool slide is provided with a four-way tool block.
The longitudinal and cross feeds can be limited by automatic disengaging boxes with an accuracy of 0,01 mm (0.0004") which eliminate difficulties in keeping lengths within specified limits. The disengaging boxes control the disengagement of the apron box and disengage without shocks because the positive stops work with low pressures. They enable any one of the 12 stops of the longitudinal or cross feed to be set quickly so that their use considerably increases the output of the lathe and it pays to adjust them even for a small number of pieces.

LUBRICATION. All rotating parts are oil lubricated from the drain piping of the hydraulic (plunger) pump. The guide surfaces of the bed and cross slide rest are lubricated by means of a hand distributor filled by the apron box pump.
The apron box is lubricated by its own eccentric driven plunger pump.
Self-lubricated sliding bearings made of sintered powder metal are used in all inaccessible place.

THE COOLING EQUIPMENT consists of a 120 litre (26½ Imp. gallon) coolant tank, a centrifugal pump with independent electric motor drive and adjustable piping for distribution to the cutting points.

ELECTRICAL EQUIPMENT. The electrical equipment of the whole machine, consisting of remote controlled contactors with thermal overload protection and an ammeter, is fitted in a self-contained cabinet erected at a suitable place and separate from the machine.

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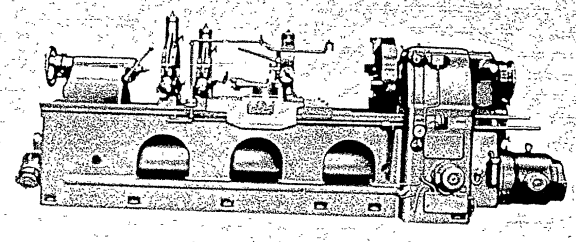
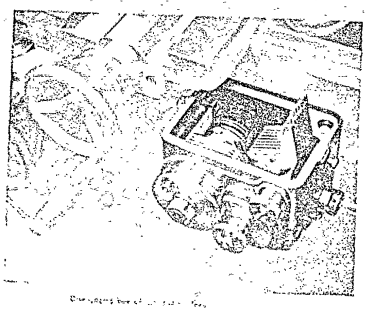
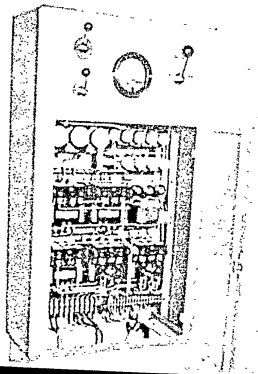


Rear view of machine





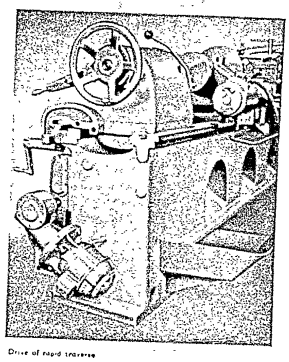
Electric control panel

STANDARD EQUIPMENT

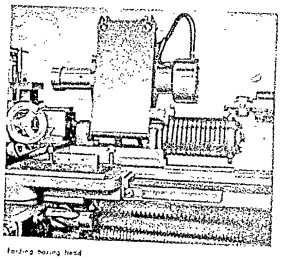
Electrical equipment including 2 electric motors — Hydraulic equipment for the control of clutches and brakes — Chip pan — Driver plate — Reducing sleeve for main spindle — 2 dead centres (Morse 5 and Morse 6) — 13 change gears for screwcutting (for type SU 63) — 6 change gears for spindle speeds (for type SU 63) — 2 change gears for screwcutting (for type SS 63) — 6 change gears for spindle speeds (for type SS 63) — Support of lead screw and longitudinal rods (for distance between centres of 2750 mm (108") upward) — Positive stop — Wheel puller for change gears — Fourway tool block — Screen type oil cleaner — Set of spanners — Operating tables (on machine) — Operating instruction booklet.

SPECIAL EQUIPMENT

Cooling system including electrical equipment — 3 - or 4 - jaw chuck with 320 mm dia. back plate — 4 - jaw face plate — Steady rest, small — Steady rest, large — Follow rest — Hand travel of tailstock — Rapid traverse including electrical equipment — Thread indicator (for type SU only) — Lever-operated movement of tailstock centre sleeve — Pressure operated movement of tailstock centre sleeve — Hydraulic copying attachment — Mechanical taper turning attachment — Pneumatic chuck — Disengaging box of longitudinal feed — Disengaging box of cross feed — Rear tool post with fixed head — Rear tool post with revolving head — Chamfering head — Folding boring head — Live centre — Lighting equipment.

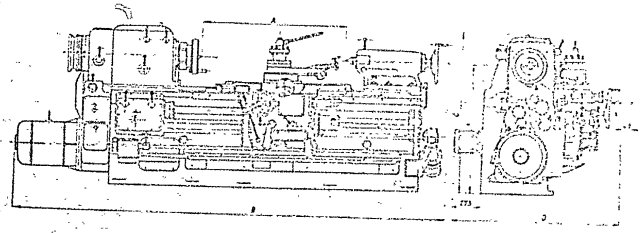


Drive of rapid traverse



Folding boring head

Amm	1250	2000	2750	3500	5000	6500	8000
Bmm	3742	4492	5242	5992	7492	8992	10492
Cmm	1398	1398	1398	1398	1398	1398	1398
Dmm	1683	1683	1683	1683	1683	1683	1683
Lmm	1120	1120	1120	1120	1120	1120	1120
Q kg	4600	5000	5400	5800	6600	7400	8200



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SPECIFICATION:

		SU 63	SS 63
Swing over bed	mm	630	25"
Swing over carriage	mm	375	15"
Swing in small steady rest	mm	220	8½"
Swing in large steady rest	mm	380	15"
Swing in follow rest	mm	200	8"
Distance between centres	mm	1250, 2000, 2750, 3500, 5000, 6500, 8000 49", 79", 108", 138", 197", 256", 315"	
Turning length with taper turning attachment	mm	650	25.6"
Bore of spindle	mm	60	2¾"
Taper in spindle		M 70	1 : 20
Outer taper of spindle	mm dia	133.35—3.5 . 12	
Width of bed	mm	567	22"
Diameter of face plate	mm	650	26"
Diameter of driver plate	mm	300	12"
Diameter of universal chuck	mm	320	13"
Dimension of four-way tool post	mm	214×214×132	8½"×8½"×5¼"
Maximum cross section of tool	mm	40×40	1.56"×1.56"
Diameter of tailstock centre sleeve	mm	120	4¾"
Movement of tailstock centre sleeve	mm	290	11½"
Taper in tailstock centre sleeve		No. 6 Morse	
Spindle speeds: Number of speeds		5×24	
Range of speeds: Series I	r. p. m	8 to 375	
Series II	r. p. m	10.6 to 500	
Series III	r. p. m.	14 to 670	
Series IV	r. p. m.	19 to 900	
Series V	r. p. m.	25 to 1180	
Feeds: Number		41	24
Range of longitudinal feeds	mm per rev.	0.064 to 6	0.109 to 6
	cuts per inch	4 23 to 373	
Range of cross feeds		0.382 times longit feeds	
Diameter × pitch of lead screw	mm	60×12	
Threads: 48 metric	mm	0.219 to 48	
32 metric	mm		0 219 to 48
37 Whitworth threads per inch		1/16 to 48	
48 module, pitch per module		0.054 to 12	
36 diametral pitch, threads per inch dia		3½ to 192	
36 circular pitch, pitch inches		7 256 to 1½	
Rapid traverse	metres per min	5 16 feet per min.	
Main drive motor: speed	r. p. m	1420/710	
output	kW	17/10	
Rapid traverse motor speed	r. p m	1400	
output	kW	1 1	
Coolant pump motor speed	r. p. m.	2775	
output	kW	0 3	
Motor of hydraulic system, speed	r p. m	1400	
output	kW	1 1	
Weight of machine with standard equipment (3500 mm/138" turning length)	kg	5800	12 800 lbs

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

STROJEXPORT

PRAHA-CZECHOSLOVAKIA

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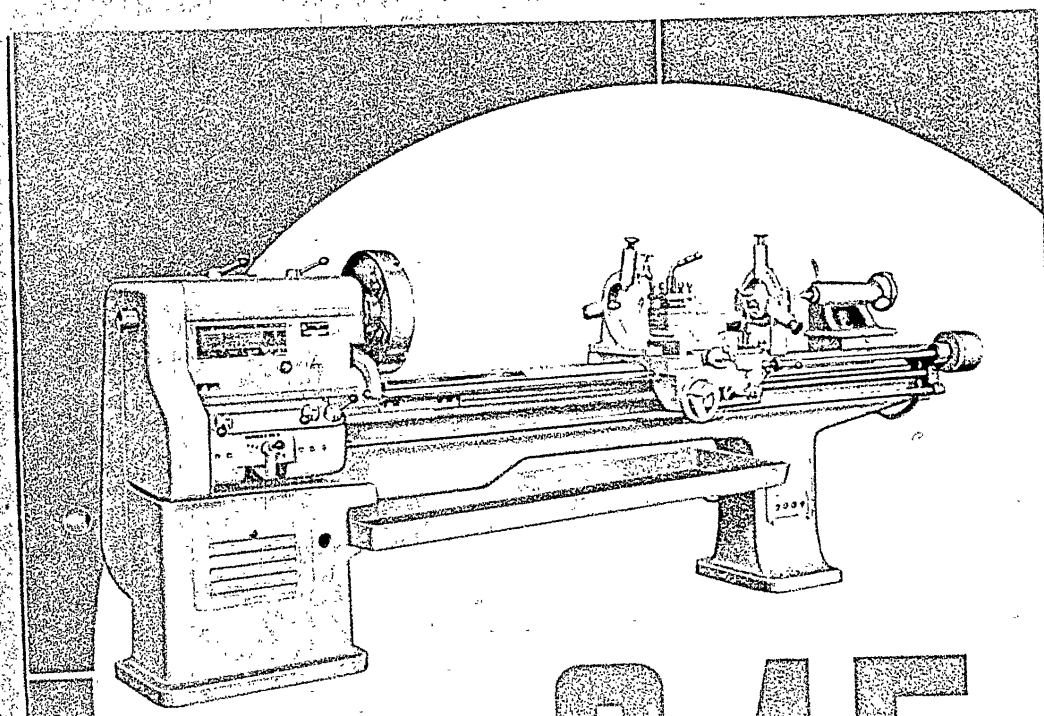

Centre Lathe

MODEL

C 45

This is a plain production lathe intended for all current turning operations especially in medium-size works and workshops both with single part and series production.

The machines are made in two sizes for the turning lengths of 1500 and 2000 mm.

with swing over bed of 450 mm.

TOS

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INGENIOUS DESIGN.

ACCURACY TESTED ACCORDING TO DR. SCHLESINGER'S LIMITS

RELIABILITY IN SERVICE

LOW PURCHASING COSTS

C 45

At its front end the main spindle runs in a precision bronze bushed taper bearing with the provision of eliminating the play

Thrust on spindle is taken up by an axial ball bearing.

All gears are driven off an electric motor by V-belts with the provision of belt tension adjustment

Feeds are actuated by a draw-bar, and a lead screw serves for threading

The carriage guides on the bed are prismatic in front and flat at the rear In front the bed ways are protected against the entrance of chips by a chip guard mounted on the longitudinal slide

In front of face plate the bed is provided with a gap into which a removable bridge is fitted

The machine is equipped with a cooling attachment The coolant pump is driven off the main motor by a belt.

Circulation system lubrication of the headstock is provided, the plunger pump being driven by an eccenter.

Metric, Whitworth, Module and Diametral Pitch threads of all current pitches can be cut on the machine

Starting and stopping of spindle in either direction and engaging of feeds is done by a single lever from the operating position

Spindle speeds and feeds are easily changed.

STANDARD EQUIPMENT·

The machine is supplied with complete accessories for all current [illegible] standard equipment is already included in the price of the machine

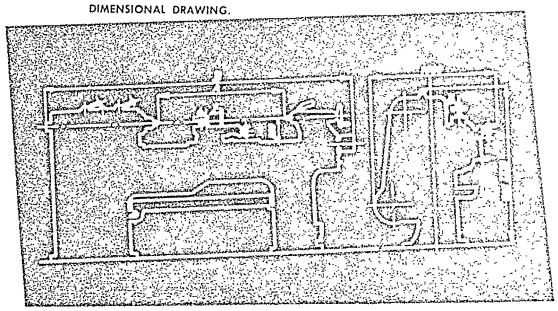
Electric motor with electrical equipment, motor pulley and belt	Backplate for [illegible]
Cooling-Attachment.	Lathe centres
Four-way tool block	Reducing sleeve
Three-jaw self-centring chuck	Set of change gears
Chip pan	Steady rest
Thread indicator.	Follow rest
Spot light.	Service spanners
Catch plate	Operating plates
Face plate.	Operator's [illegible]

SPECIAL EQUIPMENT:

On special order and at an extra charge the machine is [illegible] spindle speed range of 28—710 r p m

OPTIONAL EQUIPMENT· Four jaw self-centring chuck

DIMENSIONAL DRAWING.



C 45	A	B
1500	1500	2950
40 "	59 "	116
2000	2000	3450
79	79	136

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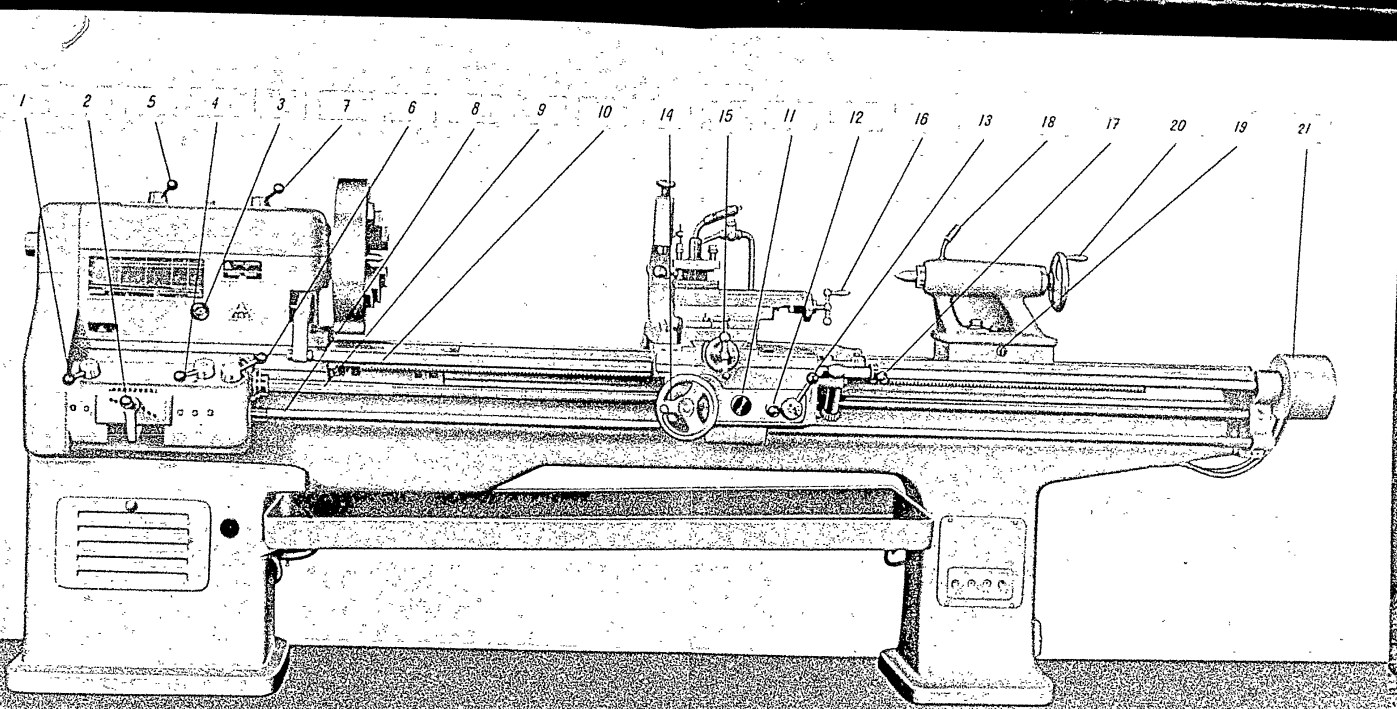

CONTROLS

1. Lever for changing the lead rate and the pitch of thread.
2. Lever of quick change gear box.
3. Oil level gauge.
4. Lever for changing the lead rate and the pitch of thread and for disengaging the draw bar and the lead screw.
5. Lever for the spindle speeds change.
6. Lever for engaging and disengaging the lead screw.
7. Lever for the spindle speed change.
8. Draw bar.
9. Lead screw.
10. Disengaging shaft.
11. Engaging and disengaging of the automatic feeds.
12. Clamping of the longitudinal or cross feeds.
13. Engaging and disengaging of the clasp.
14. Hand wheel for the longitudinal carriage feed on bed.
15. Crank for the cross adjustment of top slide.
16. Crank for the longitudinal adjustment of top slide.
17. Starting lever and lever for changing the feed direction.
18. Lever for clamping the spindle sleeve.
19. Screw for the cross adjustment of tail stock.
20. Hand wheel for adjusting the spindle sleeve.
21. Master switch of the main drive motor.

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SPECIFICATION:

		Metric	English
Swing over bed	mm	450	17 ¾"
Distance between centres	mm	1500—2000	59 ¼"—79"
Swing over carriage	mm	290	11 ⅜"
Swing in gap	mm	630	25"
Width of gap	mm	220	8 ⅝"
Width of bed	mm	330	13"
Diameter of face plate	mm	400	15 ¾"
Spindle bore	mm	51	2"
Taper in spindle	metric	55	55
Taper of centres	Morse	4	4
Spindle nose according to		DIN 800	DIN 800
Spindle speeds: 8 in number, ranging from	r. p. m.	18—450	18—450
High speed range (on special order)	r. p. m.	28—710	28—710
Feeds: Number		54	54
Range of longitudinal feeds	mm/r	0,057—3,45	7,35— 446 cuts p. in.
Range of cross feeds	mm/r	0,019—1,15	2—1335 cuts p. in.
Pitch of lead screw	t. p. i.	4	4
Threads: Number		54	54
Metric, pitch	mm	0.25—8	
Whitworth	t. p. i.	2—120	2—120
Module	mm	0.25—8	
Diametral pitch		4—240	4—240
Motor: Speed	r. p. m.	1400	1400
Output	HP	4	4
Floor space required (turning length 2000 mm)	mm	1000×3450	39 ½"×136"
For distance between centres	mm	1500 2000	59 ¼" 79"
Weight of machine: with standard equipment	kg	1500 1600	lbs. 3540 3740
with packing	kg	1650 1750	lbs. 3630 3850
with seaworthy packing	kg	1950 2100	lbs. 4300 4650
Contents boxed	m³	5.05 5.85	cu. ft. 179 208

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE, AND FREQUENCY OF POWER SUPPLY!

STROJEXPORT

PRAHA • CZECHOSLOVAKIA

ČOK 670413 a — 5565

Printed in Czechoslovakia

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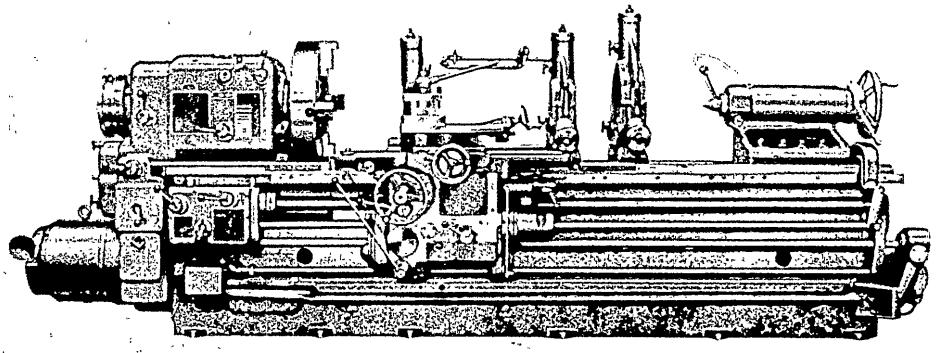
NEW CENTER LATHE Model SU80



This machine is intended for accurate machining operations using one or more tools and is particularly suitable for the single part production of non-uniform parts. It is equipped for the cutting of all kinds of threads in a wide range of pitches. The threads may be rough cut by means of the carriage feed driven off a rack and pinion. That saves the leadscrew which is only used for accurate finishing of threads. The attachments and instruments supplied as special equipment make this machine universal and increase its applicability to all turning operations.

The machine is marked by a wide range of spindle speeds, a high capacity and a high precision and affords an economic utilization of cemented carbide tipped tools or tools with a negative rake at high cutting speeds.

TOS

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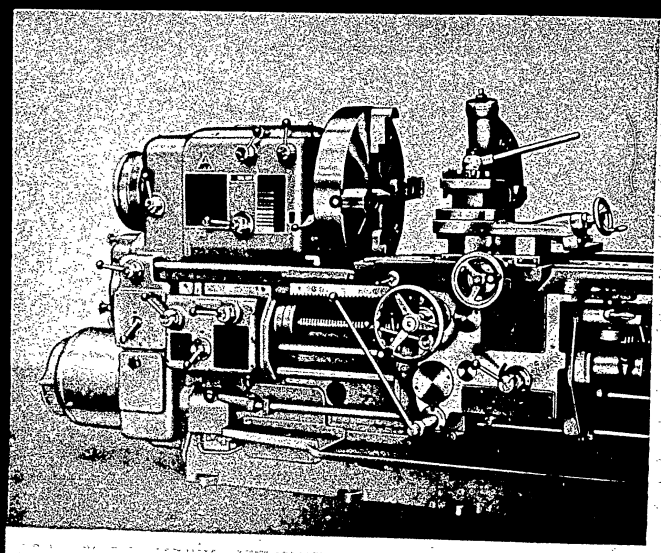


CENTER LATHE Model SU80

DESCRIPTION

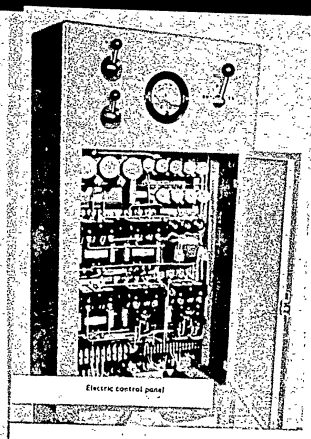
THE HEADSTOCK

is formed by a rigid, completely enclosed box which reduces vibrations to a minimum even at maximum load of the machine. The main spindle is driven by a two speed pole-changing a. c. squirel cage induction motor through a twelve-step gear box with three pairs of change gears giving five different ranges of basic speeds of the main spindle. Precision machining is ensured by a sturdy system of bearings of the main spindle comprising adjustable doublerow anti-friction bearings and by a dynamic balance of rotating parts.

The direction of rotation of the spindle is reversed by reversing the main drive motor. That applies to normal turning as well as to threading.

Two multi-plate clutches in the gear box serve for engaging and disengaging the gears and are controlled by a hydraulic cylinder acting through the centre of the hollow shaft.

Two efficient shoe brakes are provided for quickly stopping the main spindle and for quickly changing its speeds. One of them acts upon the lower countershaft near the main motor, the other one directly upon the main spindle.



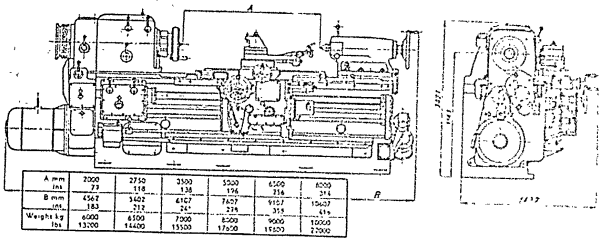
Electric control panel

STANDARD EQUIPMENT:

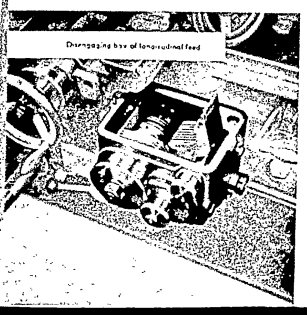
Electrical equipment including 2 electric motors — Hydraulic equipment for the control of clutches and brakes — Chip pans — Driver plate — Reducing sleeve for main spindle — 2 dead centres (Morse 5 and Morse 6) — 13 change gears — 6 change gears for spindle speeds — Support of lead screw and longitudinal rods (for distance between centers of 2750 mm [108"] upward) — Positive stop — Wheel puller for change gears — Gearquadrant for change gears for special threads — Four-way tool block — Screen type oil cleaner — Set of spanners — Operating tables (on machine) — Operating instruction booklet.

SPECIAL EQUIPMENT:

Cooling system including electrical equipment — 4-jaw face plate — Steady rest, small — Steady rest, large — Follow rest — Hand travel of tailstock — Rapid traverse including electrical equipment — Thread indicator — Lever operated movement of tailstock center sleeve — Pressure operated movement of tailstock center sleeve — 3 or 4-jaw chuck with 410 mm (16") dia. flange — Hydraulic copying attachment — Mechanical taper turning attachment — Pneumatic chuck — Disengaging box of longitudinal feed — Disengaging box of cross feed — Rear tool post with fixed head — Rear tool post with revolving head — Chamfering head — Folding boring head — Spring-loaded center — Lighting equipment.



A mm / ins	2000 / 79	2750 / 118	3500 / 138	5500 / 196	6500 / 256	8000 / 314
B mm / ins	4562 / 183	5402 / 212	6167 / 242	7457 / 294	9157 / 359	10607 / 414
Weight kg / lbs	6000 / 13200	6500 / 14400	7000 / 15500	8000 / 17600	9000 / 19500	10000 / 22000



Disengaging box of longitudinal feed

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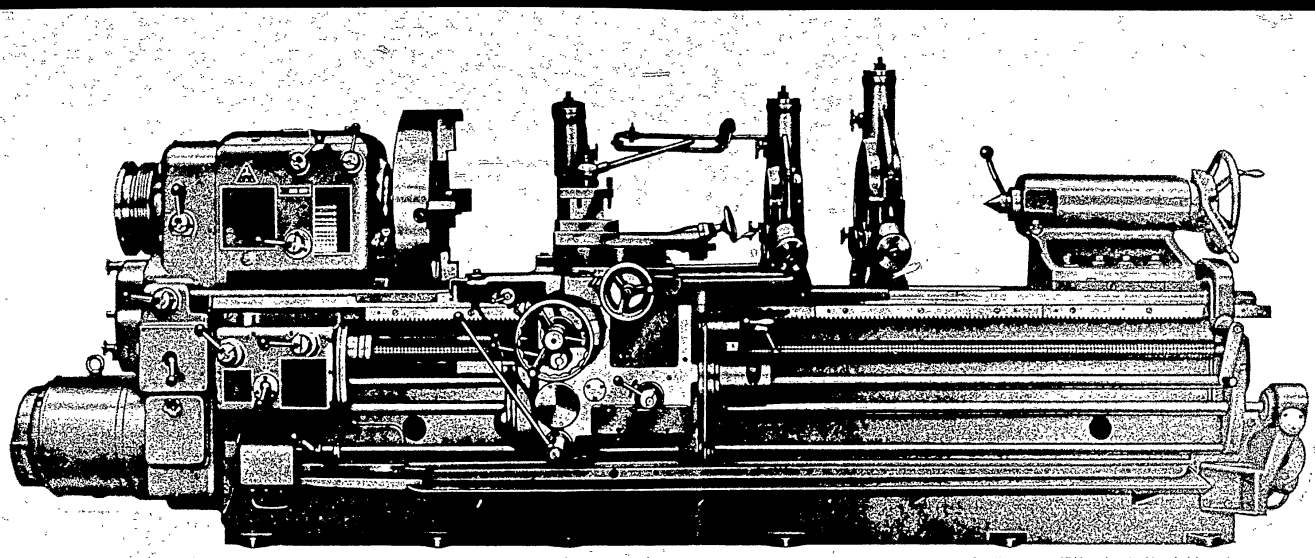

The front end of the spindle is provided with an ISA taper. It affords an easy exchange of chucks and prevents them from working themselves loose when reversing the spindle rotation.

THREADING BOX

The lathe is equipped with a large threading box designed for the cutting of metric, Whitworth, module, diametral pitch and circular pitch threads in a wide range. Each kind of threads is covered by a single setting of change gears. The threading box is sealed oil-tight and has no slot for the tumbler lever.

THE CARRIAGE

moves on the wide bed-ways. The longitudinal and cross feeds are operated by hand as well as by power. The tool slide is provided with a four-way tool block.

The longitudinal and cross feeds can be limited by automatic disengaging boxes with an accuracy of 0.01 mm (0.0004") which eliminate difficulties in keeping lengths within specified limits. The disengaging boxes control the disengagement of the apron box and disengage without shocks, because the positive stops work with low pressure.

They enable any one of 12 stops of the longitudinal or cross feed to be set quickly so that their use considerably increases the output of the lathe and it pays to adjust them even for a small number of pieces.

LUBRICATION

All rotating parts are lubricated with oil from the draining pipes of the hydraulic pump.

The bed and carriage guideways are lubricated by the pump of the apron box via a hand distributor. The apron box is lubricated by its own eccentric driven plunger pump.

THE COOLING EQUIPMENT

consists of a 120 litres (26½ Imp. gallon) coolant tank, a centrifugal pump with independent electric motor drive and adjustable piping for distribution to the cutting points.

ELECTRICAL EQUIPMENT

The electrical equipment of the whole machine consisting of remote controlled contactors with thermal overload protection and an ammeter is fitted in a self-contained cabinet erected at a suitable place separate from the machine.

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SPECIFICATION:

		Metric	English
Swing over bed	mm	800	31.5"
Swing over carriage	mm	495	19.5"
Swing in steady rest	mm	50—310	2"—12 2"
Swing in follow rest	mm	200	7.8"
Distance between centers	mm	2000—8000	78"—315"
Distance between centers with taper bar	mm	650	25.6"
Bore of spindle	mm	70	2.76"
Taper in spindle	metr.	80	80
Taper of center	Morse	5	5
Outer taper of spindle	mm	O 165.1×95—1 : 3.4286	
Width of bed	mm	698	27.6"
Diameter of face plate	mm	850	33.4"
Diameter of driver plate	mm	310	12.2"
Diameter of universal chuck	mm	410	16.3"
Dimensions of four-way tool block	mm	214×214	8.5"×8.5"
Maximum cross section of tool	mm	40×40	1.57"×1.57"
Diameter of tailstock center sleeve	mm	120	4.72"
Movement of tailstock center sleeve	mm	335	13.2"
Taper in tailstock center sleeve	Morse	6	6
Maximum weight of workpiece	kg	6000	13200 lbs.
Spindle speeds: Number of speeds		5×24	5×24
Range of speeds: Series I	R. p. m.	6,7—315	
Series II	R. p. m.	9—425	
Series III	R. p. m.	11,8—560	
Series IV	R. p. m.	16—750	
Series V	R. p. m.	21.2—1000	
Feeds: Number		41	
Range of longitudinal feeds	mm p. r.	0.064—6	42"—373" cuts p. in.
Range of cross feeds		1 : 2.6 of longitudinal feeds	
Diameter×pitch of lead screw	mm	60×12	
Threads: 48 metric	mm	0.219—48	
42 Whitworth threads per inch		7/8—48	
48 module pitch per module		0.054—12	
36 diametral pitch, threads per inch dia.		3.5—192	
36 circular pitch, pitch inches		7/256—1 1/8	
Rapid traverse	metres per min.	5,1	16.7' per min.
Main drive motor: speed	R. p. m.	1420/710	
output	kW	17/10	
Rapid traverse motor:			
speed	R. p. m.	1400	
output	kW	1.1	
Coolant pump motor:			
speed	R. p. m.	2775	
output	kW	0.3	
Motor of hydraulic system:			
speed	R. p. m.	1400	
output	kW	0.1	
Weight of machine with standard equipment (3500 mm/138" turning length)	kg	7000	15500 lbs.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, the above specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

ČOK 520305 a - 5505

Printed in Czechoslovakia

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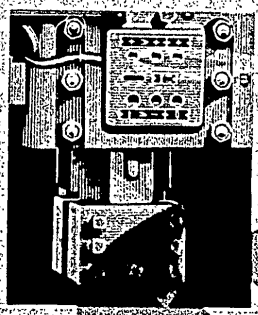
STROJEXPORT

DOUBLE HOUSING VERTICAL LATHE



TYPE

SKD

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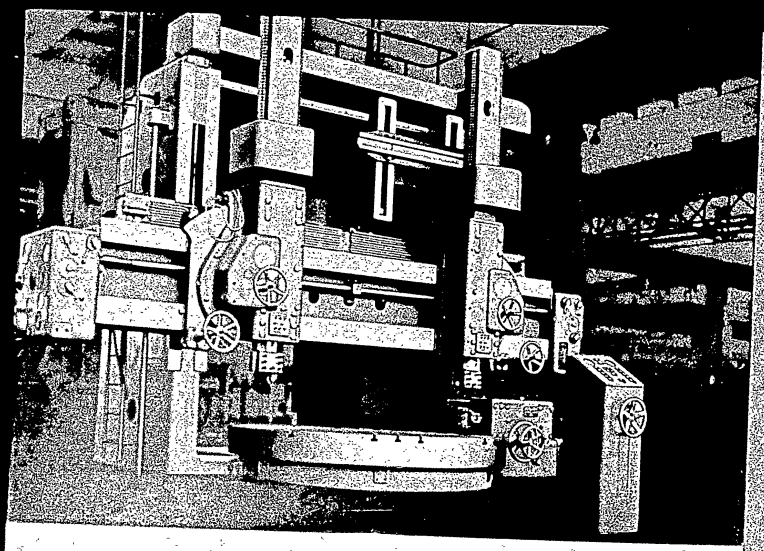


In the design of the machine the latest discoveries from the field of heavy machine tools have been utilized so that the machine corresponds to modern engineering progress and to the requirements of production. It is marked by a high output, economy, accuracy of work, easy attendance and reliability in operation.

OUTSTANDING FEATURES

- **ADEQUATELY HIGH SPEED** allows high cutting speeds to be attained and thereby tools made of high speed steel as well as cemented carbide tipped tools to be fully utilized.
- **INFINITELY VARIABLE SPEED** permits the best suitable cutting speed to be set even during operation, while the tool is in the cut.
- **ENGAGEMENT AND DISENGAGEMENT OF FEEDS** as well as of rapid traverses and their changes in the vertical or horizontal directions operated by conveniently arranged push-buttons.
- **RELEASING AND LOCKING OF CROSS RAIL** on housing operated by push-button controlled electric motor.
- **IDLE TIMES** reduced to a minimum by limiting the number of controls and by their convenient arrangement and layout.
- **CONTROL** of entire machine mostly by push-buttons from tool arms or remote control from control desk.
- **LUBRICATION** of all important assemblies automatic by means of special oil pumps or baths. The oil temperature in the bearing track is checked by thermometers with optical as well as acoustic remote signalling.
- **GEARS** made of special steel. Heavily stressed gears are hardened and ground, if necessary. Sliding gears are mounted on spline shafts. The shafts are run mostly in anti-friction bearings.

OPTIONAL EQUIPMENT

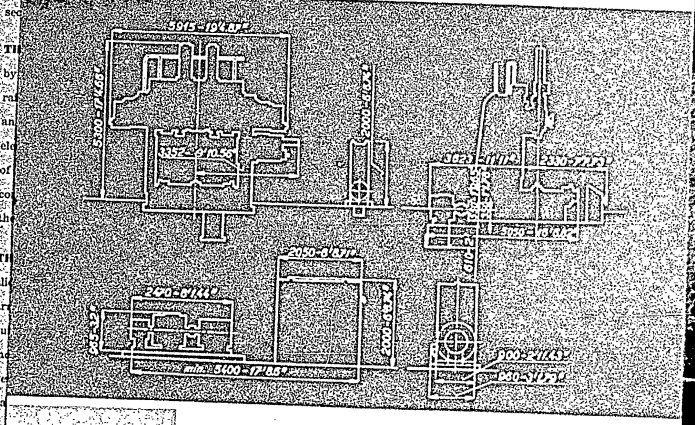
The Side Arm is guided on the right hand housing and can be lowered below the level of the table. It has its own feed box with a motor for rapid traverse. It is moved horizontally and vertically by pinions and racks. The side arm is balanced by a counterweight. It is safeguarded by a limit switch against knocking against the cross rail and also against travel beyond the extreme bottom position. Limit switches are also fitted in the extreme positions of the slide.

The Attachment for Turning Tapers by means of change gears is supplied for the right hand rail arm. It serves for turning, in conjunction with the swivelling slide, outer as well as inner tapers with any apex angle from 0° to 152°.

The Attachment for Screwcutting by means of change gears is supplied for the right hand rail arm. It is suitable for cutting metric threads with pitches from 1 to 72 mm.

The Attachment for Turning Tapers and Screwcutting by means of Change Gears is produced by combining both above mentioned attachments which are so designed that most parts are common for both. This combined attachment may therefore be recommended.

The Attachment for Turning Flat Tapers and for Copying by means of a Bar is fitted to the cross rail and designed for the right hand rail arm. By means of this attachment turning can be done by copying from a template with a maximum slant of 20° to 25° from the horizontal.



THE STANDARD EQUIPMENT OF THE MACHINE COMPRISES

2 rail arms with standard tool posts · 1 electrical equipment, however without connecting cables between the contactor cabinet, the Ward-Leonard set and the machine · 4 clamping jaws · 1 hand grease gun · 1 set of spanners in separate box

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DESCRIPTION

THE DRIVE. The table is driven by a variable speed d. c. motor, which is fed by a Ward-Leonard set, through a three-speed gear box by means of a pinion and gear rim with helical teeth. The gear with the motor is fitted in the rear part of the machine and can be removed complete without it being necessary to disturb the table. The speed of the table is infinitely variable from the control desk within the speed range of the motor of 1 : 3.5 and by means of a hand wheel in three steps. Rapid stopping of the table is accomplished by electric braking of the motor.

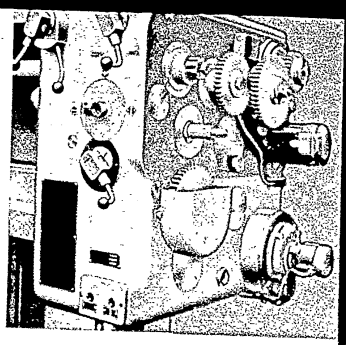
The drive can only be started when the machine has been lubricated, i. e. when oil has passed through the bearing track of the bed. The oil pumps are started as soon as the main switch on the contactor box is closed.

THE BED is box shaped and has a bearing track for the table. A soundly designed system of ribs makes the table highly rigid.

THE TABLE has a high cross section and is generously stiffened with ribs in order not to be distorted by the forces required for clamping. It is provided with a V-shaped bearing track and into the centre a spindle is pressed which is mounted in a long bush adjustable from outside and supported by a sturdy bearing also adjustable from outside. The workpiece is clamped by means of four jaws. These are fastened to the table by heavy screws and secured against movement.

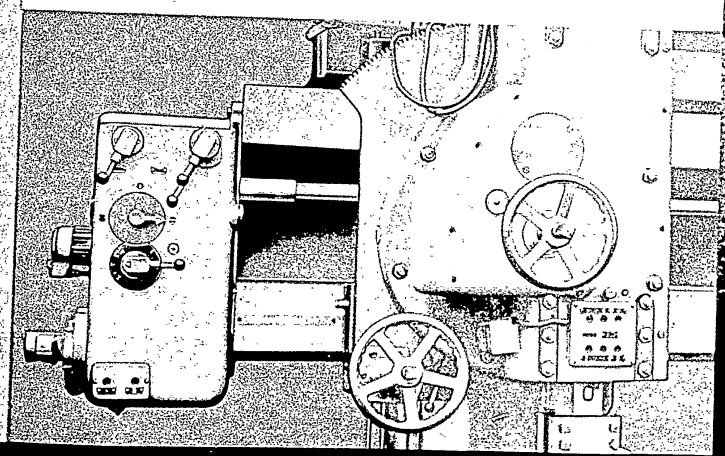
THE CROSS RAIL. The bed, housings and beam form an enclosed frame the rigidity of which is further increased by the cross rail being clamped to the housings. The large cross section and system of diagonal ribs of the cross rail lends it a high degree of stiffness. The clamping of the cross rail to the guideways of the housing is done by an electric motor controlled by push-buttons from the control desk. The cross rail is raised and lowered by an electric motor mounted on the beam which can be started only when the cross rail is released. The extreme positions of the cross rail are limited by limit switches. All controls and signalling of the cross rail are centralized on the control desk. The cross rail can be moved only when the drive is at rest and the drive can be started only when the cross rail is clamped to the housings.

THE RAIL ARMS. The cross rail carries the two rail arms. These are provided with swivelling parts on which the slides are guided. Into the tapered hole of each slide a tool post is fitted. The great height and width of the rail arm slide ensures smooth guiding even with the slide moved forward considerably. The two rail arms are mutually quite independent. They are moved horizontally by means of a screw, the slide is moved vertically by a pinion and rack. Either rail arm can be moved to the centre to a position above the table. The slide is balanced by a counterweight and the rotating part can be swivelled by a worm gear and locked in any position.
Each rail arm has its own feed box with a motor for rapid traverse at the end of the cross rail. For fine horizontal and vertical hand feed hand wheels are fitted on the rail arms. The hand feeds are operated through differential gears and are therefore quite independent of the power feeds. Push-buttons for the engagement and disengagement of power feeds and rapid traverses are also fitted on the rail arms. Push-buttons are also fitted on the control desk for remote control of the rail arms. All power feeds of the rail arms are disengaged in their extreme positions by limit switches. Limit switches are also fitted to prevent the railheads from knocking against each other.



LUBRICATION. The lubricating oil pump with the electric motor drive, electric lubrication guard and oil cleaner pumps oil from an independent tank into the bearing track. The quantity of oil for the bearing track can be adjusted by an adjusting screw, the oil pressure is checked by an oil pressure gauge. The other part of the pump supplies oil to the drive box. The oil temperature in the bearing track is checked by thermometers. When the temperature of the bearing track reaches a certain height a horn is started and a red light on the control desk lights up. The horn can be switched off only by the main switch.

THE ELECTRICAL EQUIPMENT of the machine is designed for a three-phase, four-wire system with a rated voltage of 380 Volts and a frequency of 50 cycles.
The motor for the raising and lowering of the cross rail as well as the motors for rapid traverse of the tool arms and slides are fitted with an ALMICO unit for immediate stopping.



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SPECIFICATION

Maximum swing when turning with side arm	mm	2500	8·2½"
Maximum swing when turning with rail arm (with side arm lowered below table)	mm	2600	8·6¼"
Diameter of table	mm	2400	7·10½"
Maximum vertical distance, table to tool post of rail arm	mm	1600	5·3"
Maximum vertical distance, table to tool post of side arm	mm	1300	4·4¾"
Vertical travel of rail arm slides	mm	1000	3·3¼"
Horizontal movement of side arm slide	mm	800	2·7½"
Maximum diameter of hole turned by rail arms, approx.	mm	360	1·2"
Distance, centre of table to tool post of side arm,			
maximum	mm	1300	4·3"
minimum	mm	500	1·7½"
Clamping capacity of jaws			
from diameter	mm	450	1·5¾"
to diameter	mm	2200	7·3¾"
Vertical travel of cross rail	mm	1400	4·7"
Maximum weight of workpiece	kg	10000 to 12000	22000 to 26450 lb
Maximum torque on table	kgcm	800000	58000 ft.
Swivel of rail arm slides			
with tool toward centre		15°	
with tool away from centre		30°	
Distance between housings	mm	2700	8·10¼"
Speed of table:			
infinitely variable speeds in three ranges. Speeds stated at no load of machine:			
1st speed ranging from	r. p. m.	0.66 to 3	
2nd speed ranging from	r. p. m.	2.3 to 10.4	
3rd speed ranging from	r. p. m.	7.8 to 35	
Power feeds of tool arm, horizontal, vertical or slanting:			
number		14	
range, per revolution	mm	0.6 to 14.2	0.024" to 0.570"
Metric threads with pitches	mm	1 to 72	—
Rapid traverses of all tool arms and slides, per min.	mm	1920	6·3½"
Hand feed of all tool arms per revolution of hand wheel	mm	2	0.08"
Rate of movement of cross rail per minute, approx.	mm	500	1·7½"
Approximate weight of machine with side head	kg	49570	109 280 lbs
Approximate shipping weight of machine in seaworthy packing including side head	kg	51200	112 880 lbs
Volume of machine with optional equipment, in seaworthy packing	cu. metres	72	2540 cu. ft
Dimensions of machine:			
width	mm	6300	20·8"
height	mm	5640	18·6"
length	mm	6600	21·8"
Electrical equipment for three-phase, 4 wire system, 50 cycles, 380 Volts:			
1 Ward-Leonard set with three-phase motor	kW	63	
1 d. c. driving motor for constant output of 40 kW, speed range 1 : 3.5 at constant output	kW	7.5	
1 Three-phase motor for movement of cross rail	kW	3	
3 Three-phase motors (for clamping of cross rail, cooling of variable speed motor and lubrication)	kW	6.4	
6 Three-phase motors for rail arms (rapid traverse, operation of clutches and lubrication of feed boxes)	kW	3	
2 Three-phase motors for side arm (rapid traverse, lubrication)	kW	83	
Total input of machine with side arm			

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

COK 52029 a - 5507 - Svět 06 585-55

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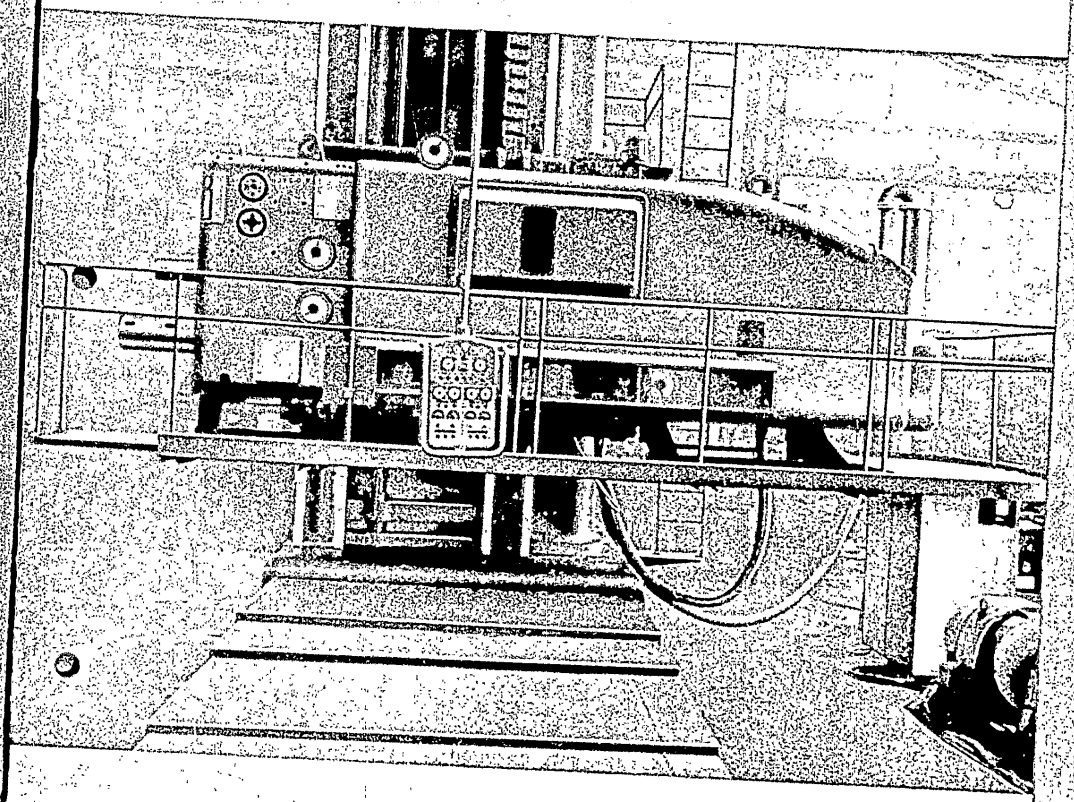

WD 250

HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

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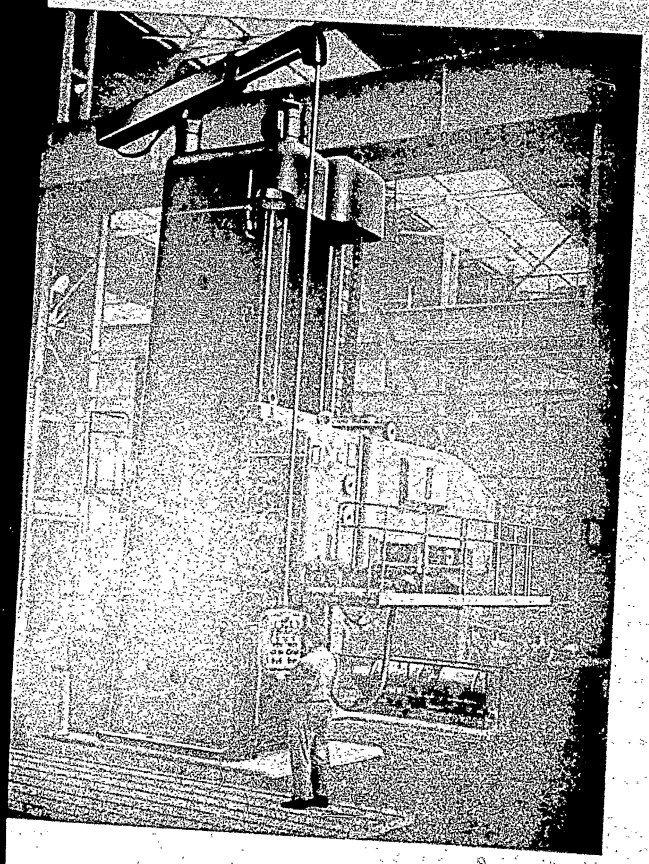

TYPE WD 250
HORIZONTAL FLOOR PLATE TYPE BORING MACHINE

The machine is intended for drilling, boring and milling work on big and heavy workpieces.

Its design is based on entirely new principles, different from those of existing designs.

The machine has two spindles, a main spindle and a high speed spindle, arranged above each other. Their high speeds considerably extend the working range and utilization of the machine for high speed machining.

The machine is built as a right hand unit, i.e. with the column and headstock at the right hand side and the clamping plate with the workpiece at the left hand side when viewed from the operator's post.

OUTSTANDING FEATURES:

Main drive by d. c. electric motor with infinitely variable speed control.

Horizontal sliding movement of headstock with both spindles.

Infinite variation of speeds by commutator motors independent of spindle speed.

Independent feed units.

Remote control of machine.

Automatic locking units.

Dial-type remote measuring gauges.

Precision approach to given dimension by means of cutting device.

Automatic periodic lubrication of guiding surfaces.

Minimum wear of guiding surfaces.

Screwcutting equipment.

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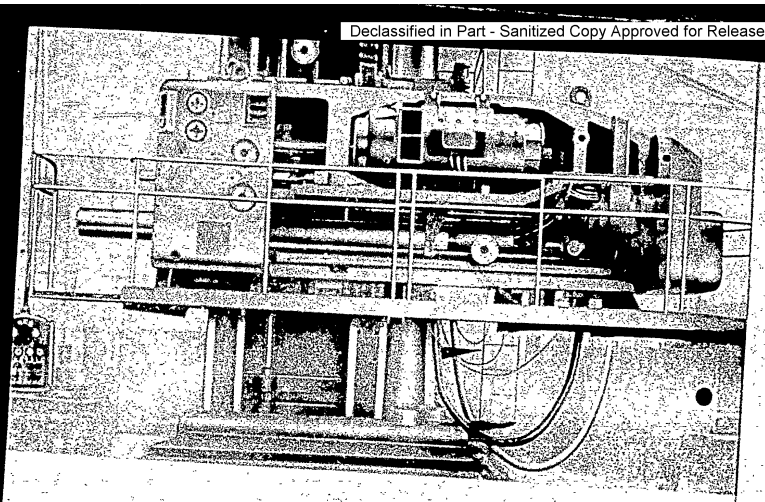


DESCRIPTION:

HEADSTOCK:

The headstock contains the motors for the drive of the spindles and feeds, the transmission and power distribution assemblies for the spindles, the screwcutting equipment, the disc type gauges for remote measuring as well as the clamping units for locking in position. The headstock has a main and a high speed spindle mounted above each other. The high speed spindle increases the working range and with it the utilization of the machine.

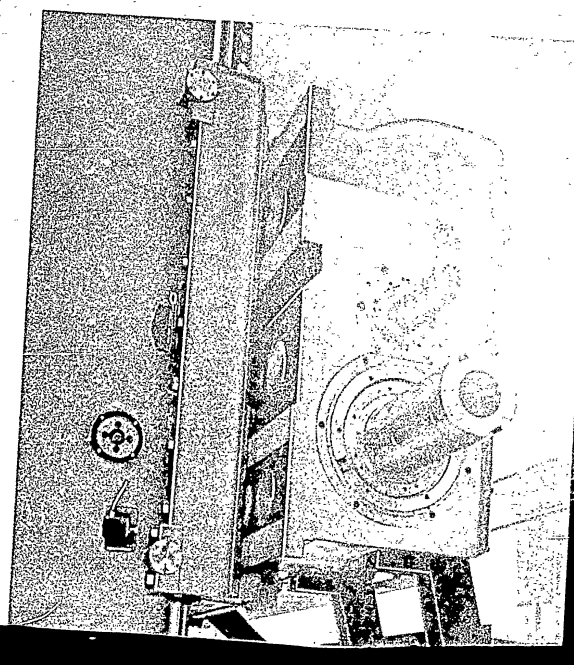
Both spindles are mounted in double-row roller bearings with an arrangement for fine adjustment of the play.

The headstock has a horizontal movement in the rear slide with which it moves vertically on the column. This design considerably increases the rigidity of the machine and also the precision of work including not only milling but also boring with the tool commodrably forward. Another advantage of this arrangement of the headstock is that the main and high speed spindles move forward together and that the guide bearing need not be moved to obtain an additional depth of boring.

WD
250

FEEDS:

The machine is equipped with transverse power feeds of the column on the bed, vertical power feeds of the headstock on the column and longitudinal power feeds of both spindles and the headstock. The kinds of feed enumerated above have their own feed unit fitted with a commutator type electric motor. The machine is equipped, apart from the working feeds, with rapid traverses in all directions. The feeds are infinitely variable independently of the spindle speed. The feed units are mounted directly at the driving screws or pinions. Thus the long shafts with the corresponding transmissions are dispensed with. The engagement of gears is pneumatic with electromagnetic control valves.



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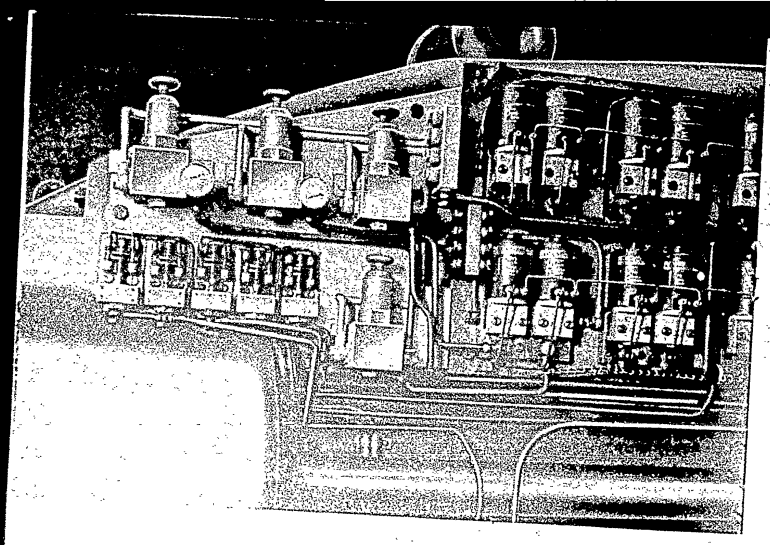


DRIVE:

A d. c. motor with infinitely variable speed control is used for the main drive. It is fed by a Ward-Leonard set with a 1 : 10 range of control. This range is increased to 1 : 200 by a three-speed transmission.

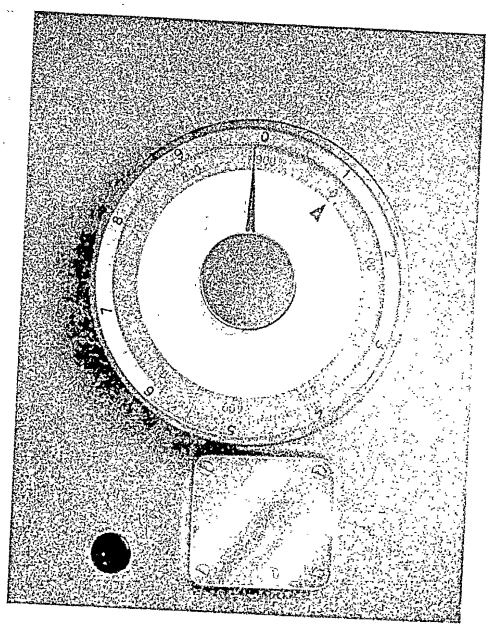
The engagement of the gears is pneumatic with electromagnetically operated distributor valves. When the drive is switched off braking by counter-current takes place automatically.

REMOTE CONTROL OF MACHINE:

The machine has not a single hand operated control element. The entire control is centralized in a suspended push-button box the setting of which in the required position in the horizontal as well as vertical direction is also electrically operated. The panel of this box carries the levers, push-buttons, tachometers and signal lights. These controls operate electromagnetic valves of the pneumatic servo-cylinders for the sliding of gears, for the locking of moving parts of the machine by means of special locking units, for pre-selection, starting and stopping of feeds and rapid traverses and for the setting of the required speeds or feeds by servomotors in accordance with the tachometer.

DISC TYPE REMOTE MEASURING GAUGES:

The inconvenient and inaccurate rod type gauges with verniers used in the past have been replaced by disc type gauges affording a reading, with an accuracy of 0.02 mm, of the distances through which both spindles and the headstock slide travel in the horizontal direction, the headstock on the column vertically and the column crosswise on the bed.



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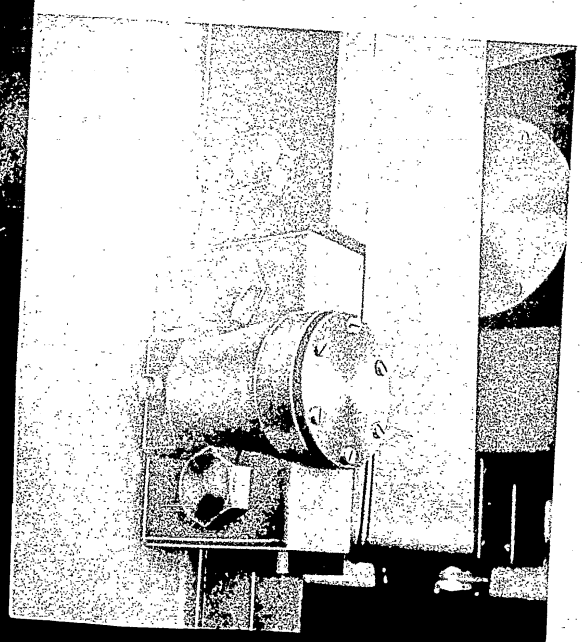
SETTING OF TOOL:

An accurate setting of the tool in the cut is made possible by the inching equipment. The commutator motors for the feeds run only as long as the appropriate push-buttons are held depressed and thus permit the tool to be set in the desired position with an accuracy of 0,02 mm.

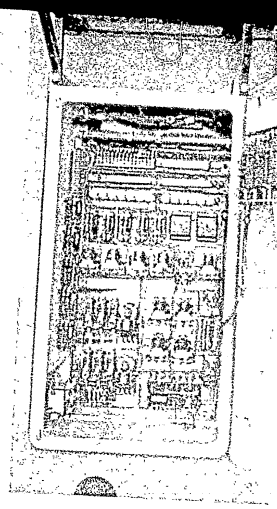
AUTOMATIC LOCKING UNITS:

All moving parts of the machine are fitted with locking units which secure them in position. Only those units are unlocked which belong to a part of the machine the feed of which happens to be in operation.



LUBRICATION:

The transmission in the headstock as well as in the feed units is lubricated by circulation by separate lubricating oil pumps the operation of which is checked by means of signal lights. The headstock and all feed units are lubricated by pressure pumps which are started together with the corresponding feed. The main guiding surfaces are periodically automatically lubricated by pumps at intervals which may be set as required by means of timing relays.



MINIMUM WEAR OF GUIDING SURFACES:

To prevent wear or seizing of guiding surfaces the guideways of the bottom of the column are lined with sliding plates of a synthetic resin base material. In addition to that the guideways on the bed are protected by sliding covers. The headstock slide moves on the column on hardened and ground steel bars screwed to the column.

SCREWCUTTING:

The main spindle is fitted with a screwcutting equipment consisting of a lead screw with a [illegible] headstock through a gear box with change gears on a quadrant. The high speed spindle is [illegible] cutting.

COLUMN:

The column is box shaped and generously stiffened with ribs. The counterweight for balancing the headstock [illegible] in the hollow of the column. The cabinets with the electrical equipment are arranged on the rear and side [illegible] the column. The movement of the column on the bed is operated by means of a pinion and [illegible]

BED:

The bed is of ample width and provided with wide guideways which afford perfect guidance and a safe support of the column even under the heaviest load.

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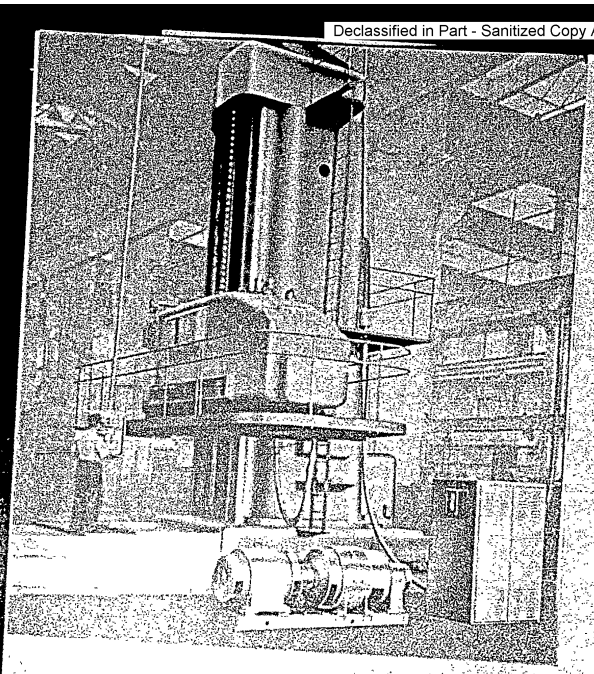


STANDARD EQUIPMENT:

Operating instructions, name plates, set of spanners, grease gun, wedges, ejectors, tool cabinet, screw-cutting equipment.

OPTIONAL EQUIPMENT:

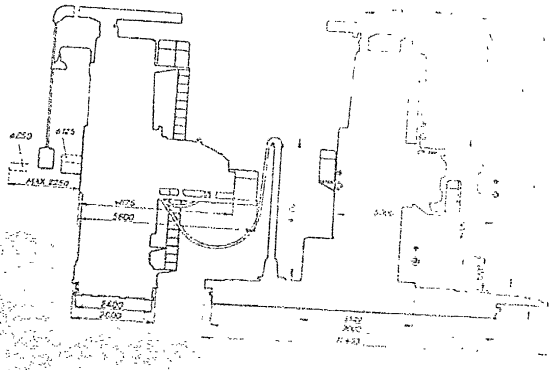
I. Electrical Equipment: a) of machine
b) of back rest
c) of cooling equipment
d) of circular table
e) of face plate

II. a) back rest
b) cooling equipment
c) circular table
d) bed plate

III. Attachments: a) face plate
b) drilling and milling at an angle, in three designs (sizes)
c) surface grinding
d) hollow grinding
e) drilling of tapered holes
f) extensions for attachments
g) optical equipment for setting of back rest

IV. Tools: a) boring bars with bushes for back rest
b) tool holders
c) boring heads
d) milling head
e) milling arbours
f) universal milling heads

V. a) Set of spare parts for mechanical parts of machine
b) Set of spare parts for electrical equipment



COOLING:

The cooling is done by a circulating system. The coolant is circulated by an electric motor driven centrifugal pump with a piping through which the coolant is supplied to the point of work from a tank, arranged apart from the machine.

THE BACK REST:

The back rest consists of a bed, which is set up on the clamping plate, and a column with the boring bar support. The rapid traverse of the column on the bed and of the boring bar support on the column is power operated, both being equipped with an independent electric motor. The fine adjustment is made by hand. The setting of the distance is indicated by dial type remote reading gauges of an accuracy of 0.02 mm.

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SPECIFICATION

WD 250

Diameter of main spindle	mm 250	9 27/32"
Diameter of high speed spindle	mm 125	4 29/32"
Taper in main spindle	Metric 140	
Taper in high speed spindle	Metric 80	
Maximum torque on main spindle	kgcm 300 000	21700 ft.-lbs
Maximum torque on high speed spindle	kgcm 45 000	3250 ft.-lbs
Maximum depth of boring with main spindle	mm 2250	7'4 1/2"
Maximum depth of boring with high speed spindle	mm 630	2' 3/4"
Sliding movement of headstock	mm 500	1' 5/8"
Vertical movement of headstock on column	mm 4000	13'1 1/2"
Travel of column on bed	mm 5000	16'4 3/4"
Main spindle speeds	r. p. m. 2 to 400	
High speed spindle speeds	r. p. m. 6.25 to 1250	
Drilling feeds (main spindle, high speed spindle, slide), infinitely variable, per minute	mm 0.8 to 780	1/32" to 2'6 3/4"
Milling feeds (headstock — vertical, column — horizontal) infinitely variable, per minute	mm 0.8 to 780	1/32" to 2'6 3/4"
Rapid traverses, per minute	mm 1200	4'
Screwcutting by means of drilling spindle: 21 metric threads with pitches of	mm 0.75 to 12	
32 Whitworth threads	t. p. i.	28 to 1
Output of main motor	kW 75	
Output of commutator motor for milling feeds (at maximum speed)	kW/max. r. p. m. 6/3150	
Output of commutator motor for drilling feeds (at maximum speed)	kW/max. r. p. m. 4.4/3120	
Floor space required by machine	mm 12 500 × 6000	41' × 19'9"
Height of machine	mm 9300	30'7"
Weight of machine	kg 105 000	231 500 lbs

In ordering, specify voltage, phase and frequency of power supply.

The machines are continuously being improved upon.

The particulars in the prospectus are not binding in detail.

STROJEXPORT

PRAHA — CZECHOSLOVAKIA

COK 521270a-560

Printed in Czechoslovakia

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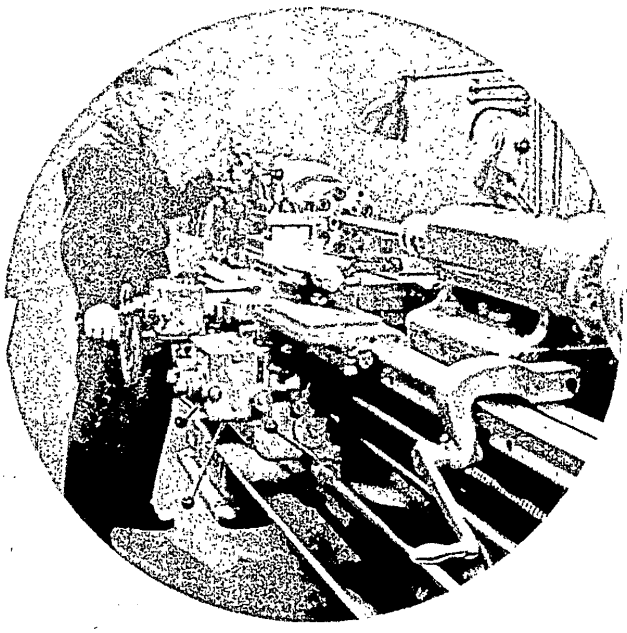
ŠKODA



CENTER LATHES

TYPE

SUR

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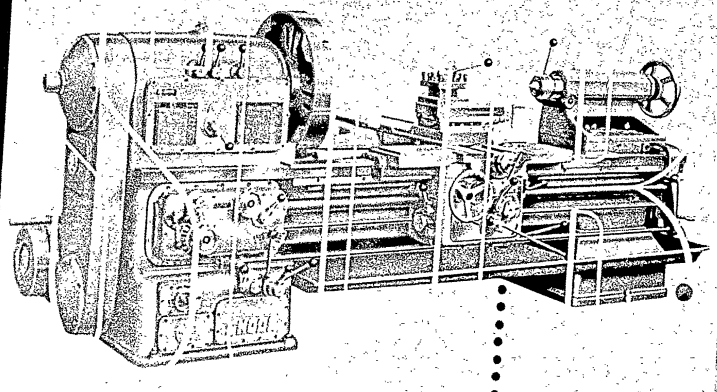


ŠKODA — CENTER LATHES TYPE SUR

The ... are designed especially heavy duty and satisfying the latest demands placed on economical machining of ... and other metals. Thanks to their rigidity, range and steps of spindle speeds and exceptionally high ... they are ideally suited for constant machining with cemented carbide tipped tools. They are highly reliable ... and retain their precision.

Their outstanding features are:

- Wide range of main spindle speeds arranged in fine steps.
- Precise mounting of the main spindle.
- Large number of rates of longitudinal and cross feeds arranged in fine steps.
- Possibility of cutting metric, Whitworth, Module, Diametral Pitch and Circular Pitch Threads.
- Favourable distribution of weights with a relatively low weight and high stability of the machine.
- Variety of optional equipment and attachments of the machine which increase its precision, output and versatility.

ŠKODA

DESCRIPTION

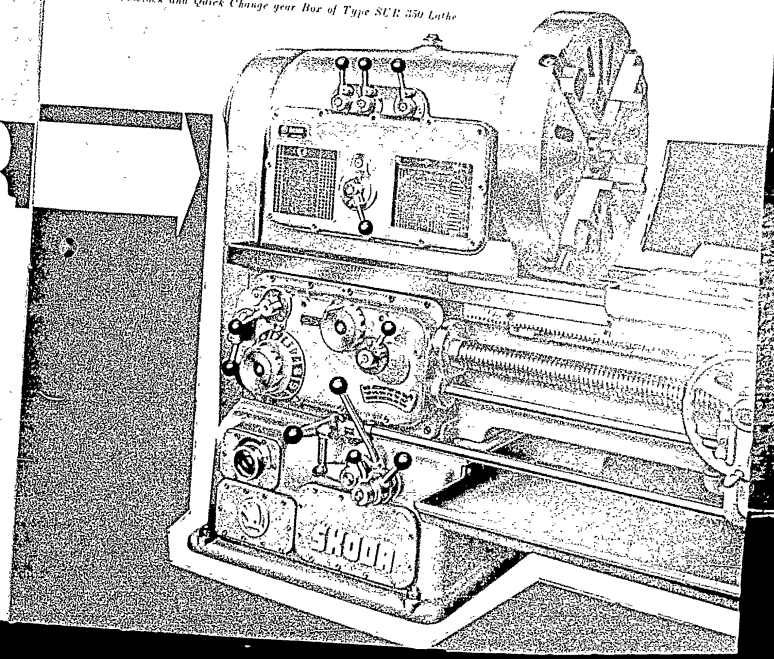
RANGE OF SPINDLE SPEEDS.

The wide overall range of main spindle speeds (1:130) is divided into fine steps and comprises 32 speeds. Sufficiently high and low speeds are available to permit the use of cemented carbide tipped tools as well as screw cutting with tools made of tool steel. The speeds are arranged in two ranges which are changed by changing the number of poles of the two-speed motor.

MAIN SPINDLE.

The massive flanged end of the main spindle ensures a rigid mounting of the face plate or chuck which will not work itself loose even if the spindle is reversed at the highest speed or if the brake is applied suddenly. The end of the spindle is surface hardened to protect it from damage when the face plate is being removed.

Headstock and Quick Change gear Box of Type SUR 550 Lathe



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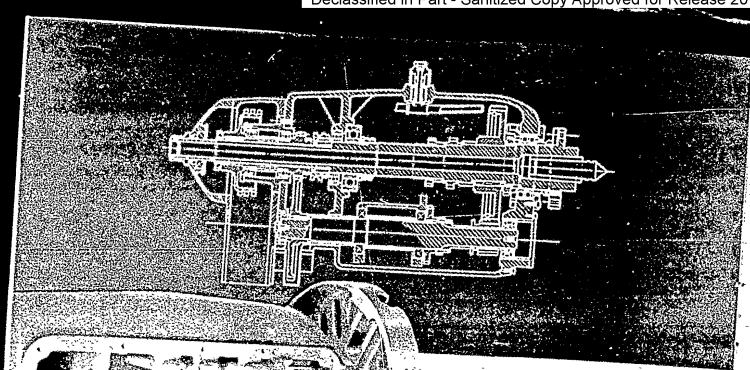
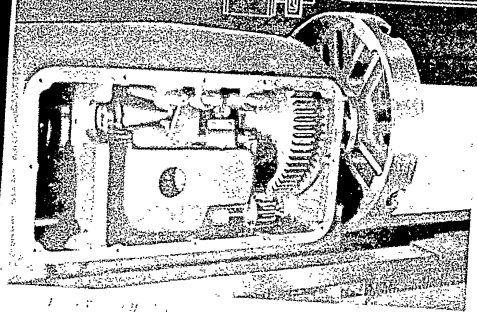


Mounting of Spindle.

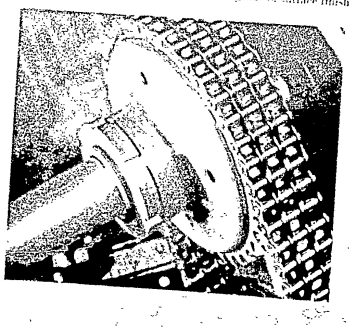


MOUNTING OF SPINDLE.

The spindle runs at its front end in a double-row precision roller bearing the play of which can be adjusted, the rear bearing is a ball bearing with a longitudinal adjustment

MAIN SPINDLE DRIVE.

[illegible] roller chain which runs in an oil bath so that it operates noiselessly The fact that [illegible] the pull of the chain eliminates adverse effects upon the precision of the [illegible] the speeds operate with the back gears out of engagement. The spindle is driven by [illegible] high grade of surface finish of the workpiece.

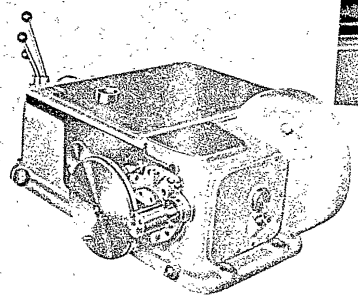


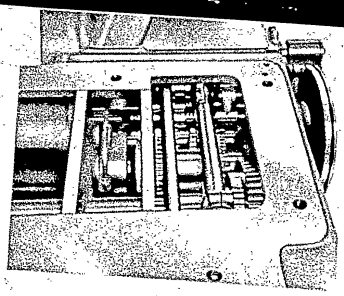
Chain Drive of Spindle.

SKODA

GEAR ASSEMBLY.

The location of the gear assembly apart from the headstock in the leg of the machine contributes to the smooth operation of the machine and eliminates unfavourable influences of temperature.





Gear Box.

MAIN CLUTCH.

The main clutch is of the multi plate type It is of generous dimensions and permits the machine to be started smoothly without jerks in either direction The starting lever on the apron box engages the clutch in its extreme positions In its centre position it disengages the clutch and applies the brake at the same time The lubrication of the clutch is automatic

CHANGE GEARS.

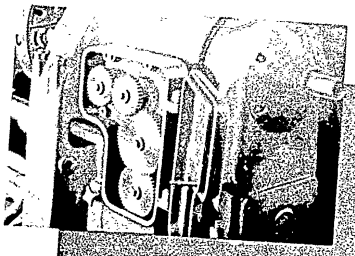
The change gears are mounted on spline shafts at the rear of the headstock. The shafts run in [illegible] are lubricated by an oil bath. The change of gears is quick because the movement of the gear [illegible] the quadrant is dispensed with

QUICK CHANGE GEAR BOX.

The quick change gear box is completely enclosed without any slot for the gear change lever which [illegible] chines, makes sealing impossible. All commonly used thread pitches and rates of feed can be [illegible] the levers of the quick change gear box By changing the change gears a number of other thread pitches [illegible] of feed becomes available The total number of thread pitches and rates of feed is considerably larger than [illegible] of other makes. A total of 110 metric, 99 Whitworth, 88 Module 77 Diametral Pitch and 99 Circular Pitch [illegible] be cut on the machine

BRAKE.

An efficient brake, which stops the machine, makes operation quicker It is arranged outside the gear box so that the heat generated when the brake is applied is not transmitted to the machine This contributes to the maintenance of precision of the machine.



Change Gears.

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Layout of [illegible]

2, 7 Change of Standard Feeds (in conjunction with lever 2).

3 Change of Standard Feeds (engagement of back gears).

4 Feed Reversing or R. H. — L. H. Thread Change Lever.

5 Coarse and Standard Feed of Steep and Standard Thread.

6 Back Gears Control Lever for Change of Speeds.

8. Four-Way Tool Post Locking Lever.

9. Clamping of Carriage to Bed.

10. Hand Feed of Top Carriage Slide.

11. Locking of Tailstock Sleeve.

12, 14. Tailstock Locking Screws.

13. Transverse Movement of Tailstock for Turning Slender Tapers.

15. Fine Adjustment of Tailstock Sleeve.

16. Engagement, Reversing and Disengagement of Main Spindle.

17. Power Feed of Carriage, Transverse or Longitudinal.

18, 23. Levers for Lifting of Stops in Apron Box.

19. Control Lever of Coupling for Hand Disengagement and Engagement of Transverse or Longitudinal Feed.

20. Closing or Opening of Clasp Nut.

21. Hand Feed of Cross Slide.

22. Longitudinal Hand Feed of Carriage.

24. Speed Change of Main Spindle (in conjunction with lever 6).

25. Same as 16 (auxiliary lever used chiefly for changing spindle speeds).

26. Hand Wheel on Quick Change Gear Box for Releasing and Locking of Dial (27).

27. Dial on Quick Change Gear Box for Sliding of Intermediate Gear over Quick Change Gear Sets.

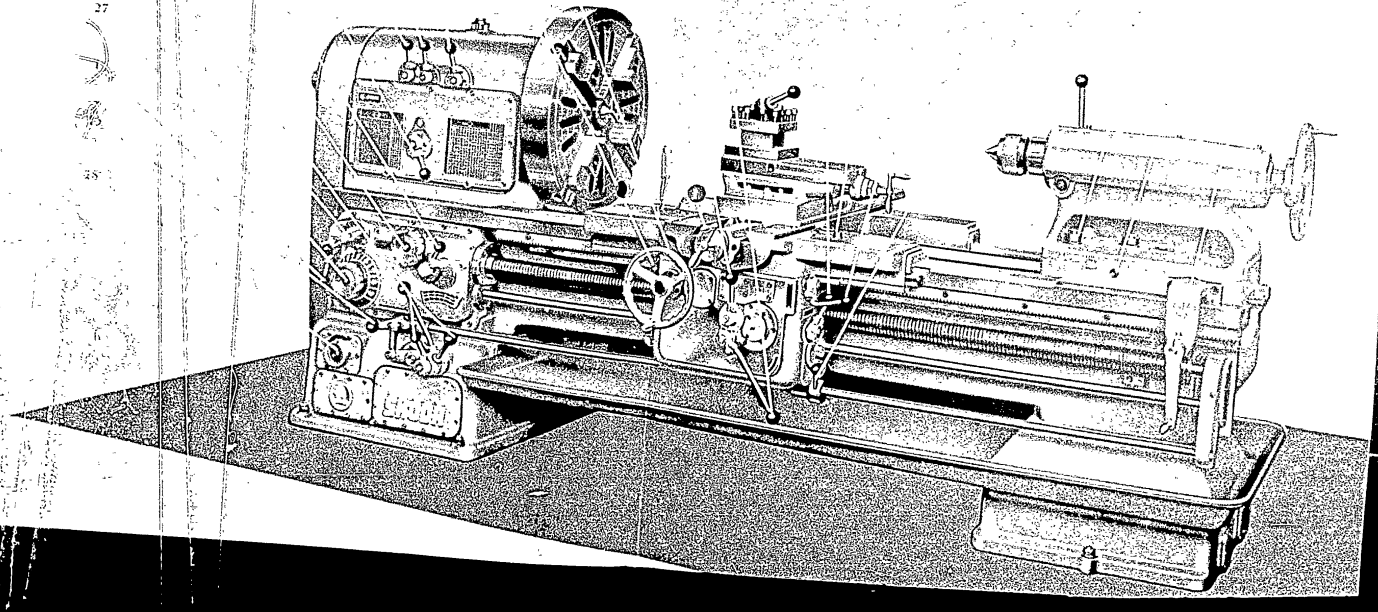
28. Electric Motor Starting and Pole Changing.

24 26 7 6 3 4 5 23 22 21 20 19 8 18 9 17 10 16 11 12 13 14 15

2

27

28



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OPTIONAL EQUIPMENT

A Third slide
– Noiseless stock support.
B Outside feed attachment for bar stock.
– Set of parts for hand insertion.
– Lighting
E Motor drive for attachments F, H, L
F High speed drilling attachment in turret head.
G Feeding equipment for attachments H, J, L.
H Slotting attachment.
J Cross drilling attachment
I Nut tapping attachment
KV Disc cam checking apparatus.
FV Disc cam cutting fixture
Z Magazines.
– Chip pans.

SPECIFICATION

WORKING RANGE			
Bar capacity without outside feed	mm	12	15/32"
Bar capacity with outside feed	mm	16	5/8"
Maximum length of feed	mm	80	3 5/32"
Maximum diameter of thread cut in steel without use of screwcutting attachment	mm	12	15/32"
Maximum diameter of thread cut in brass without use of screwcutting attachment	mm	16	5/8"
Maximum diameter of thread-cut by means of screwcutting attachment	mm	16	5/8"
Range of production time per piece	seconds	2.9 to 200	
SPINDLE			
Number of turning speeds		8	
Range of turning speeds	r. p. m.	712 to 1571	
Number of screwcutting speeds		20	24
Range of screwcutting speeds	r. p. m.	18 to 2361	
Number of screwcutting speeds available for every turning speed:			
standard		1	
to special order, total		7	
TURRET HEAD			
Diameter of turret head	mm	110	4 21/64"
8 tool holes of turret head, dia.	mm	20	3/4"
(on request inch size holes, dia.)			
Maximum length of tool from turret centre	mm	155	6 1/8"
Maximum and minimum distance, turret head to nose of spindle, including adjustment and travel	mm	35 to 100	2 5/32" to 3 5/32"
Maximum movement of turret head	mm	60	2 3/4"
Maximum length of straight line movement when turret head is rotated in forward position (snap movement of tool out of cut)	mm	50	1 17/32"
CROSS SLIDES			
Maximum travel	mm	35	1 3/32"
DRIVE			
Standard flange mounted electric motor:			
output	kW	2.55	
speed	r. p. m.	1430	
Two speed flange mounted electric motor (to special order):			
output	kW	2.6/1.7	
speed	r. p. m.	1420/935	
Floor space	mm	1350×700	54"×24"
Weight of machine	kg	1000	2250 lbs

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS

The particulars given in the prospectus are not binding due to changes caused by development.

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

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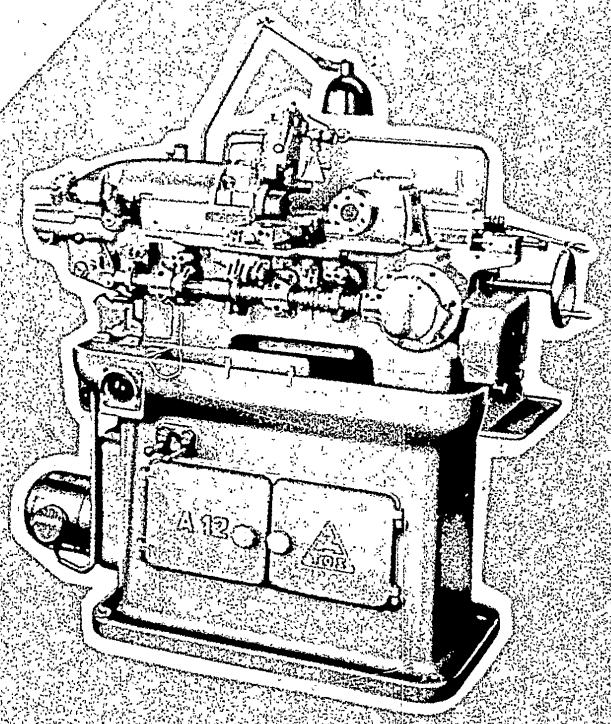
STROJEXPORT

A12

ŠKODA



TYPE A 12 AUTOMATIC MACHINE

The machine is intended for mass and multiple production of parts made of steel as well as of non-ferrous and light metals.

The headstock spindle is driven by a roller chain through the gear box in the stand of the machine.

The movements of the carriage are controlled by cams fitted to the camshaft. The turret slide is moved by means of a cam and gear segment.

STANDARD EQUIPMENT

Flange mounted electric motor with air break contactor
Reversing equipment for cutting left-hand threads (built-in)
Disc cam for swing bar stop (built-in)
Equipment for indexing turret head two tool holes (built-in)
2 bar guiding posts with spare bar carriers
1 set of change gears for spindle speeds
1 set of change gears for worm gear box
Table of speeds and change gears
1 type Uag 12 chuck collet, 12 mm dia.
1 type Uah 12 feed collet, 12 mm dia.
1 type Uaj 12 guide bush, 12 mm dia.
1 disc cam blank for turret slide
2 disc cam blanks for cross slides
*) 1 drilling jig for turret slide disc
*) 1 drilling jig for cross slide discs with appropriate insert also for third slide
*) Sample of curves of ascent and descent
1 tray for finished products
2 guard plates and covers
*) 1 set of spanners, oil can, grease gun, etc
1 set of spare parts (chain links, 2 chuck fingers 2 bushes stops, shear pins, syringe, etc).
*) 1 instruction book for operation and adjustments of automatics
*) 1 catalogue of chucking equipment and spare parts catalogue

*) Note 1 piece for 1 order, unless ordered otherwise

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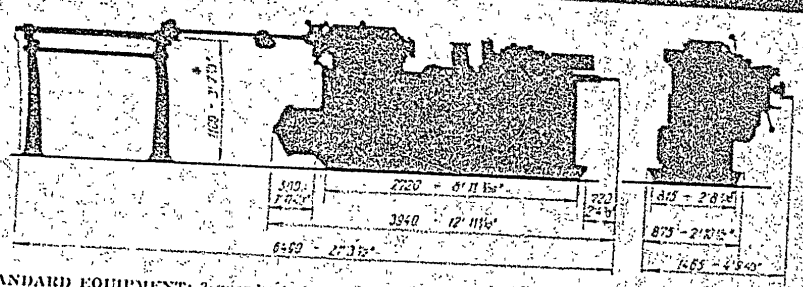
SPECIFICATIONS

Bar capacity	mm	80	3⅛"
Bore of spindle	mm	82	3¼"
Taper in spindle	metric	90	90
Swing over bed: a) with thread chasing attachment	mm	530	21
b) without thread chasing attachment	mm	530	21
Chuck capacity	mm	315	12⅜"
Maximum distance: a) turret to flange of main spindle	mm	900	35⅜"
b) turret to chuck for bar stock	mm	730	28¾"
Diameter of turret	mm	390	15⅜"
Pitch line diameter of tool holes	mm	270	10⅝"
Number of tool holes		16	16
Diameter of tool holes	mm	20 40 65	20 40 65
Spindle speeds: number		24	24
range	r.p.m.	18—900	18—900
Feeds: number		12	12
range of longitudinal feeds	mm/rev	0.06—1.8	0.06—1.8
range of cross feeds	mm/rev	0.04—1.2	0.04—1.2
Main drive motor: Speed	r.p.m.	1400/950	1400/950
Output	kW	9/9	9/9
Floor space required	mm	1160×3940	46"×155"
Length of machine with bar feed attachment and floor stands	mm	6490	255"
Weight of machine: with standard equipment	kg	4200	9,280 lbs
with packing	kg	4700	10,340 lbs
with seaworthy packing	kg	5000	11,000 lbs
Contents boxed	m³	10	353 cu. ft.



STANDARD EQUIPMENT: 3 guards, 1 chuck guard, left-hand, central and right-hand cross stop, change gears, hand-operated grease gun, various spare screws, set of spanners, tool pan, operating plates, operator's instruction booklet.

OPTIONAL EQUIPMENT: chuck with collet chuck for bar stock, quick action chuck for finishing jobs, 3-jaw universal scroll chuck with backplate, cross slide with four-way tool block, bar feed attachment with special back chuck and floor stands with standard stock-tube, centering screw chuck, longitudinal copying attachment, hold-down attachment for longitudinal copying jobs, transverse copying attachment, drum length stop, special length stop, thread chasing attachment with 1 leader and 1 follower, swing arm for die heads, supporting tailstock, high-speed drilling attachment with motor, coolant supply for the internal cooling for machines without tailstock, coolant supply for machines with tailstock, cooling attachment with piping and drive, change turret, electric motor for 220/380 or 500 volts, electrical equipment, spot light without bulb.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

FOK 55471 a - 559

Printed in Czechoslovakia

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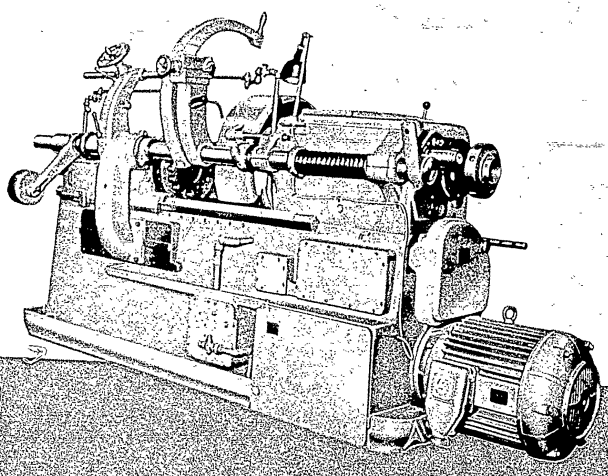


[illegible] MACHINE FOR MASS PRODUCTION OF PARTS FROM BAR STOCK [illegible] WHICH WOULD DESIGNED AND BUILT TO TAKE FULL ADVANTAGE [illegible]

[illegible] a flanged type two-speed electric motor. The six multi-plate clutches [illegible] of the main drive motor enable 8 spindle speeds in both directions [illegible] gears 3 spindle speed ranges can be obtained. The work spindle rotates [illegible] precision anti-friction bearings.

[illegible] for the turret and cut-off slide is powered from the work spindle through [illegible]

[illegible] The turret provided with 18 tool holes revolves about its horizontal axis. The longitudinal and cross feeds are effected both by hand and by power. The cross feed is obtained by the rotary motion of the turret. Adjustable stops are provided for limiting the longitudinal and cross feeds. The power feeds are automatically disengaged by stops. Safety couplings protect the machine against overload.

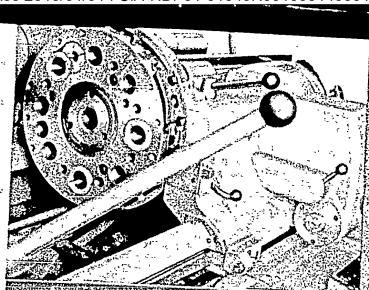
THE CUT-OFF REST with the four-way tool block is declined by 10° so as not to interfere with the tools clamped in the turret. Thus simultaneous operation both of the turret [illegible] and the cut-off rest is enabled. The longitudinal and cross feeds are effected manually and by power. The power feeds are automatically released by stops.

THE BAR FEED ATTACHMENT is controlled by a hand-operated spoon for feeding the feeding head along with the bar by means of a chain. The bar is clamped in the feeding head by gripping jaws.

THE THREAD CHASING ATTACHMENT permits the cutting of all classes of internal and external threads with the aid of a leader.

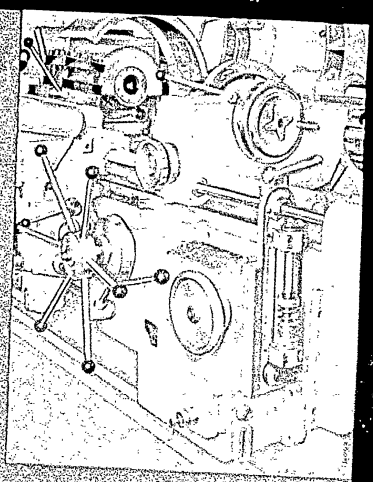
LUBRICATION. The work spindle bearings are lubricated from an individual oil tank in the top cover of the headstock. The transmission mechanism in the headstock has circulation system lubrication, the oil being supplied by a special geared pump. The turret slide and the cut-off rest are oiled by hand-operated grease guns.

COOLING SYSTEM. The coolant tank is housed inside the column. A liberal supply of coolant is provided by a gear pump.



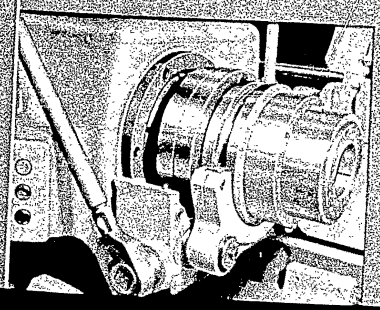
TURRET

RT 80

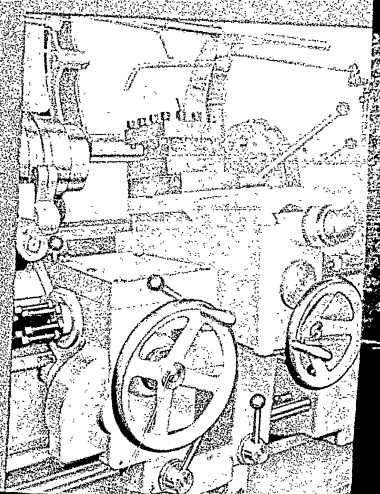


FEED GEARING

CUT-OFF REST



QUICK ACTION CHUCK



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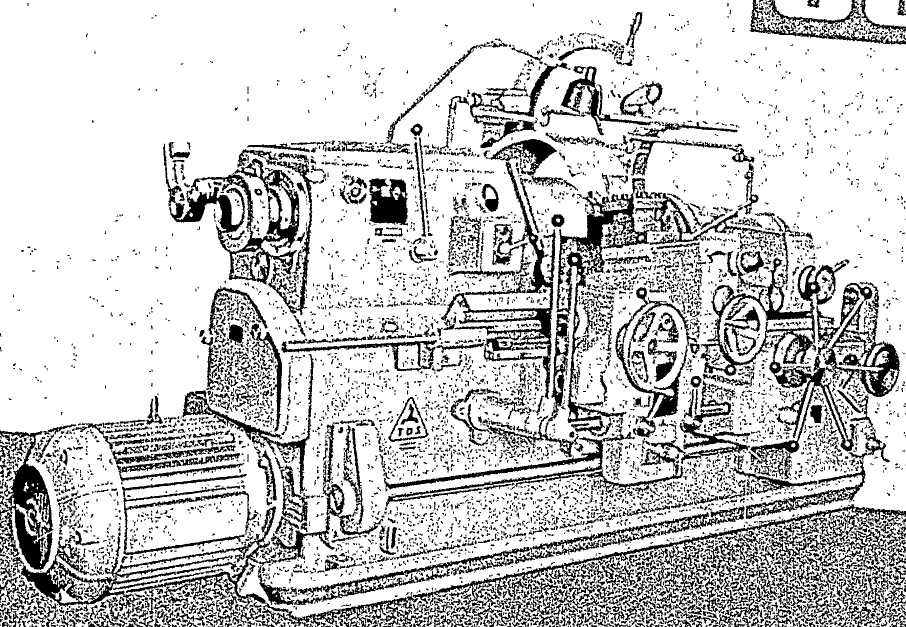
TURRET LATHE MODEL

BT 80



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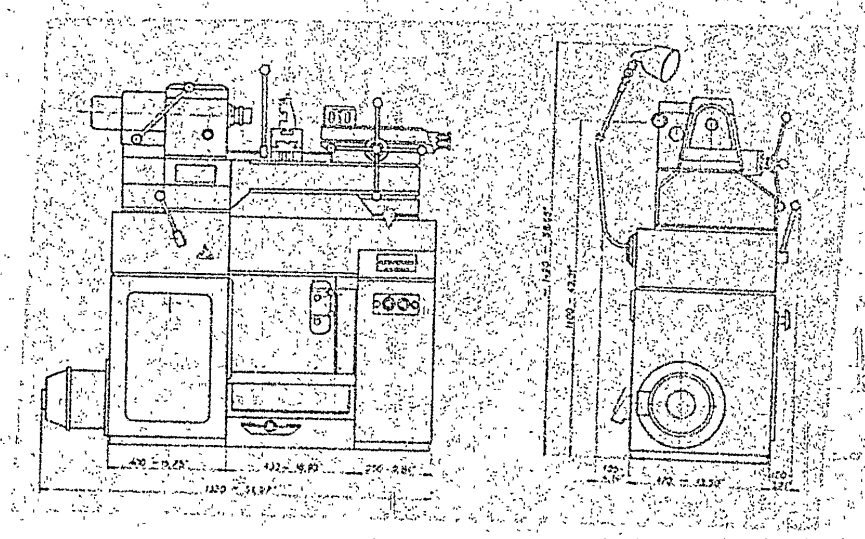
Specification

Bar capacity	mm	12 (14)	[illegible]
Spindle bore	mm	25	[illegible]
Taper in spindle			1 20
diameter	mm	28	1 3/32"
Swing over bed	mm	250	9 11/16"
Maximum distance, capstan head to:			
flange of main spindle	mm	240	9 7/16"
chuck for bar stock	mm	180	7 1/16"
Diameter of chuck	mm	100	3 15/16"
Distance of flats of capstan head	mm	110	4 5/16"
Dimensions of clamping surfaces of capstan head	mm	60×46	2 11/32" × 1 13/16"
Number of clamping surfaces for tools			6
Number of tool holes			6
Diameter of tool holes	mm		25 H6 (20 H7)
Longitudinal working movement of capstan head carriage	mm	100/145	3 15/16" × 5 11/16"
Permissible number of starts and reversals per hour			360
Spindle speeds	r. p. m.		200 to 5000
Number of speeds in either direction			16 (8)
Range of feeds of capstan head carriage, per rev.	mm	0.03 to 0.3	0.0012" to 0.012"
Electric driving motor, standard design, speed	r. p. m.		1400/2200
output	kW		1.5/1.8
Motor for coolant pump; speed	r. p. m.		2800
output	kW		0.1
Quantity of cooling water, per minute	litres	10	2.2 Imp. Galls
Floor space required by machine (width × length)	mm	550×1320	1'10"×4'4"
Weight of machine with standard equipment	kg	570	1260 lbs
Outside dimensions of packing case	mm	1550×1500×770	5'1"×4'11×2'7"
Weight of packing case, approx.	kg	250	550 lbs

Changes of details of design are reserved. — Please state the operating voltage in your order.



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ČOK 520 [illegible] — SVČT · [illegible]

Printed in Czechoslovakia

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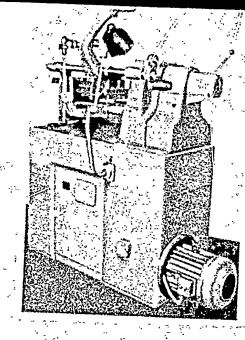
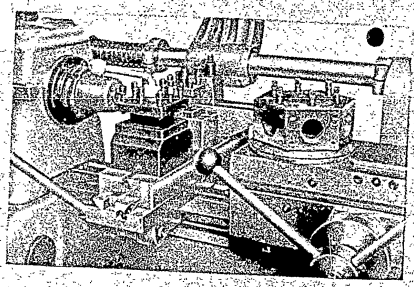
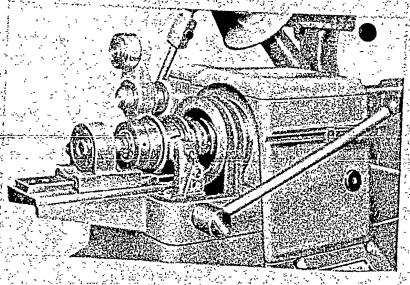


CAPSTAN LATHE TYPE R12

The type R 12 capstan lathe is a universal machine for multiple production of small parts, particularly from bar stock which is chucked and fed by means of a single lever. It is, however, also possible to turn on the lathe in a three-jaw self-centering chuck or in a bell-shaped collet for single piece work. The sturdy design of the machine makes it eminently well suited for the use of cemented carbide tipped tools. The spindle is mounted in anti-friction bearings fitted relatively close to each other. By this arrangement a high degree of rigidity of the mounting of the spindle is achieved. The machine is driven by a reversing two-speed electric motor by means of a four speed gear box and a back gear with multi-plate clutches and a brake. The maximum spindle speed is 5000 r. p. m. The number of speeds is 16.



We also supply, at customer's special request, a machine with a simplified spindle drive with eight speeds which can be changed by means of a back gear, an exchangeable pulley and electric motor. The maximum spindle speed is 5000 r. p. m.



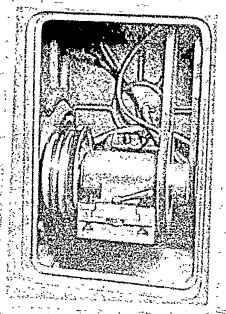
The machine is fitted with a carriage with a hexagonal capstan head. The capstan head is controlled by the star wheel for the hand feed. It turns automatically when moved to its extreme right hand position. In its working position it is locked with the play in the mounting being eliminated at the same time. The machine may be supplied, on special request, with hand and power feed of the capstan head with automatic disengagement by a positive stop.

The parting slide is operated by a lever and a segment engaging with a rack. The length of the stroke can be set by means of stops.

The operation of the machine is very simple and quick. The number of controls has been reduced to a minimum. Thus the possibility has been achieved of training quickly even a less skilled worker to operate the machine.

Most of the parts are exchangeable without any modification or adaptation.

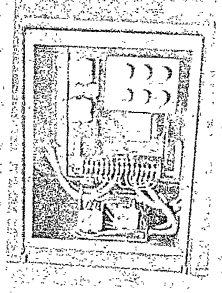
Standard Equipment: Set of spanners
grease gun.



OPTIONAL EQUIPMENT RECOMMENDED

(supplied to order against extra charge)

- Va Cooling equipment with 10 litre (2.2 Imp. Gall.) per minute electric motor driven coolant pump
- Vb Noiseless stock guide tube
- Vc Screwcutting equipment with set of thread leaders and followers for metric thread
- Vd 100 mm dia. jaw chuck with flange
- Ve Double tool post
- Vf Four-way tool post with supporting plate
- Vg Raised single-tool post
- Vh Tool post support (supplied with every machine)
- Vi Extended tool post support
- Vj Adjustable tool post
- Vl Swivelling tool post, simple
- Vn Folding tool post
- Lighting
- Collet chucking equipment



For tools for capstan lathe refer to special catalogue.

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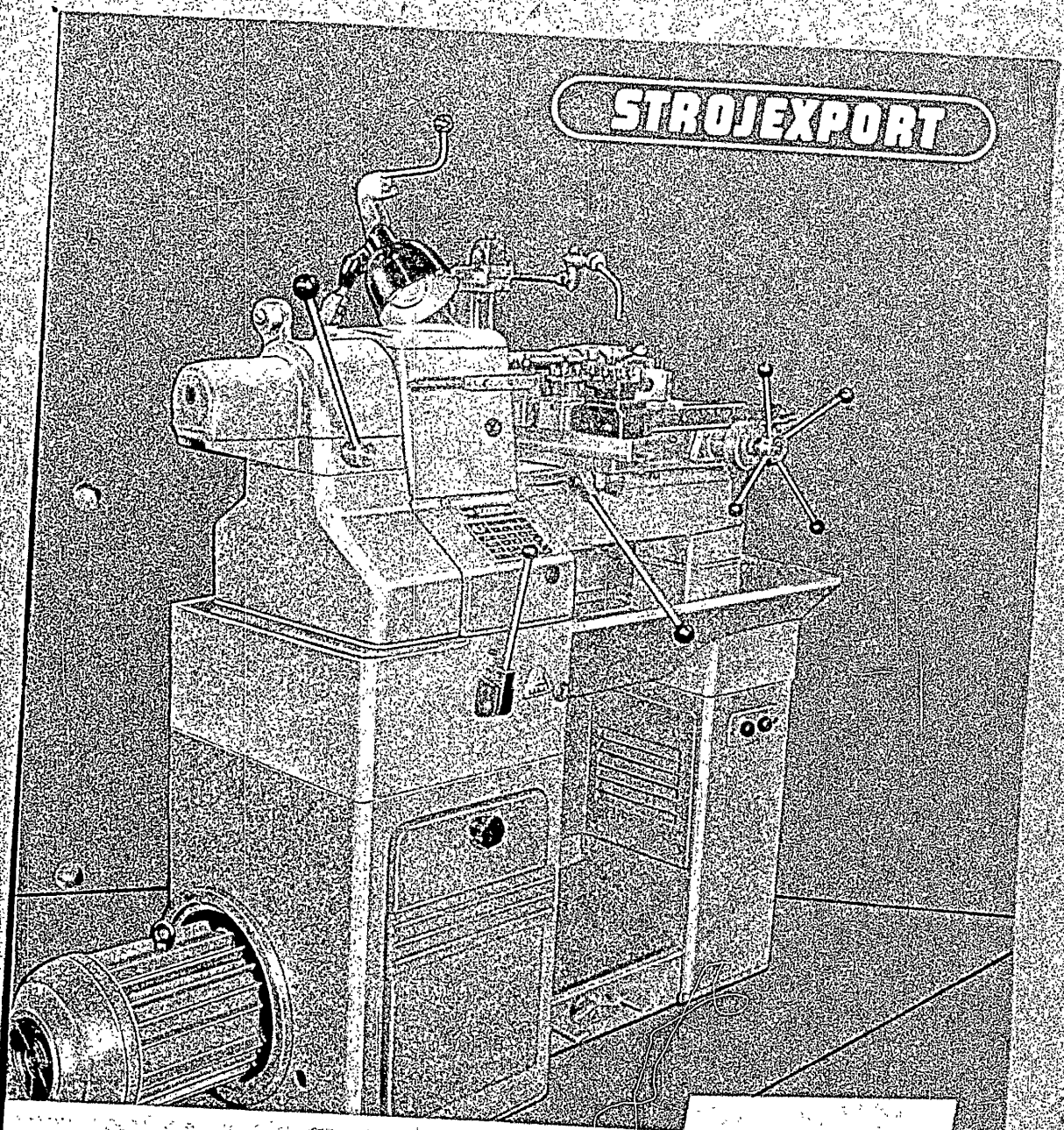

Type R

capstan lathe

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SPECIFICATION:

		CAPACITY:	
Maximum chucking diameter:			
for bar stock		mm	56 — 2 3/16"
for blanks in a chuck		mm	170 to 254*) 6 11/16" to 11 1/16"*)
*) for work with a smaller number of tools			
Diameter of chuck (Vc or Vd)		mm	250 — 9 27/32"
Maximum swing over bed:			
with screwcutting attachment		mm	320 — 12 9/16"
without screwcutting attachment		mm	550 — 21 21/32"
Maximum distance:			
turret head to main spindle flange		mm	760 — 30"
turret head to chuck for bar stock		mm	610 — 24"
		TURRET HEAD:	
Diameter of pitch circle of tool holes		mm	290 — 9 1/16"
number of tool holes			10
Number X diameter of tool holes		mm	7 × 30 — 7 × 1 3/16"
			7 × 45 — 7 × 1 25/32"
*) double hole			2 × 56*) — 2 × 2 13/32"*)
Maximum longitudinal travel of turret slide		mm	610 — 24"
		SPEEDS:	
Number of speeds (forward and reverse)			70
Speed ranges (set by change gears supplied as standard equipment of machine):			
No. I range (with 10 steps)		r. p. m.	18 to 400
No. II range (with 10 steps)		r. p. m.	22 to 500
No. III range (with 10 steps)		r. p. m.	28 to 630
No. IV range (with 10 steps)		r. p. m.	35 to 800
No. V range (with 10 steps)		r. p. m.	45 to 1000
No. VI range (with 10 steps)		r. p. m.	56 to 1250
No. VII range (with 10 steps)		r. p. m.	71 to 1600
		FEEDS:	
Number of longitudinal and cross feeds			9
Range of longitudinal feeds		mm per rev.	0.068 to 0.90
		inches per rev.	0.0022" to 0.036"
Range of cross feeds		mm per rev.	0.035 to 0.45
		inches per rev.	0.0011" to 0.018"
		MAIN THREE-SPEED ELECTRIC MOTOR:	
Permissible number of reversals (at 670 or 680 r. p. m.)		per hour	120 (at a uniform rate)
Speed		r. p. m.	680 to 2880
Maximum power at full utilization of machine		kW	15.7
		DIMENSIONS AND WEIGHTS:	
Floor space (without stock feed attachment)		mm	3435 × 1150 — 11'3" × 3'9"
Length of machine with stock feed attachment and stands for guiding of bar stock		mm	6480 — 21'3"
Height of centre-line of spindle above floor		mm	1065 — 3'6"
Weight of machine with standard equipment		kg	2600 — 5730 lbs
Weight of railway packing		kg	230 — 455 lbs
Weight of seaworthy packing		kg	450 — 990 lbs
Dimensions of seaworthy packing		mm	3430 × 1240 × 1650 — 11'3" × 4'1" × 5'5"

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS!

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

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Headstock is provided with large bearings outside the guideways of the bed so that the forces acting on the main spindle are transmitted to the bed without any distortions.

Main spindle brake is located outside the headstock so that its efficient cooling is ensured; therefore the heat generated by braking causes no heating of the headstock mechanism.

The oil pump is submerged and placed so low that, should any leakage develop later, it cannot affect the adequate supply of lubricating oil. Lubrication of headstock by ordinary engine oil which is also used for all other assemblies of the machine so that only this single grade of lubricant is required for the entire machine.

Accurate disengagement (within 0.1 mm) of the longitudinal power feed in the direction of the headstock either by means of adjustable stop pins of the stop drum on the turret slide, or by a drum stop which is supplied as special equipment of the machine and fixed on the front side of the bed, or by means of a simple folding stop. Before the final disengagement of the feed the turret slide is pressed, during a few revolutions of the headstock spindle, by a force which, to a certain extent is adjustable against the stop so that, once the automatic feed is disengaged, it is no longer necessary to finish turning to an accurate length by the hand feed, while watching the indicator

Accurate disengagement (within 0.1 mm) of the cross power feed of the turret head forward and backward by means of adjustable cross stops, three of which are supplied as standard equipment with each machine; this accurate disengagement makes it possible to strictly maintain the closest limits.

Simple cross feed drive, which is obtained from the longitudinal feed is the shortest way, simplifies the operation of the mechanism and reduces the oil consumption.

Simple but reliable protection of the longitudinal and cross feed mechanism against overload by means of the above described automatic disengagement of the longitudinal and cross feeds which cannot fail, in contrast to the usually employed protective clutches the reliability of which depends on correct adjustment and attendance.

Simple engagement and disengagement of cross feed by a simple downward movement of the crank without any further movement.

Protruding front end of turret head shaft designed to support the tool holders, in order to prevent them from vibrating, when turning with cemented carbide tipped tools, even with the heaviest cuts.

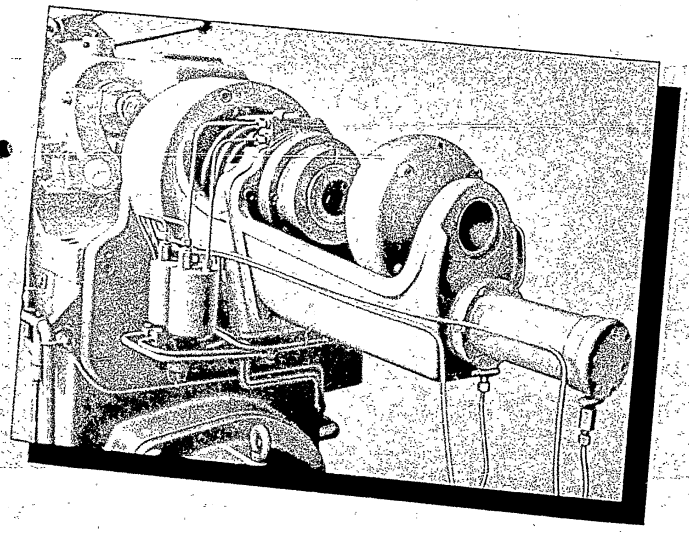
Oil-tight feed box and apron The parts of the feed mechanism contained therein are abundantly lubricated either automatically or by means of a hand pump so that there are only few points requiring separate additional lubrication. This simplifies the attendance, reduces the oil consumption as well as the wear of the parts and prolongs the precision of the machine.

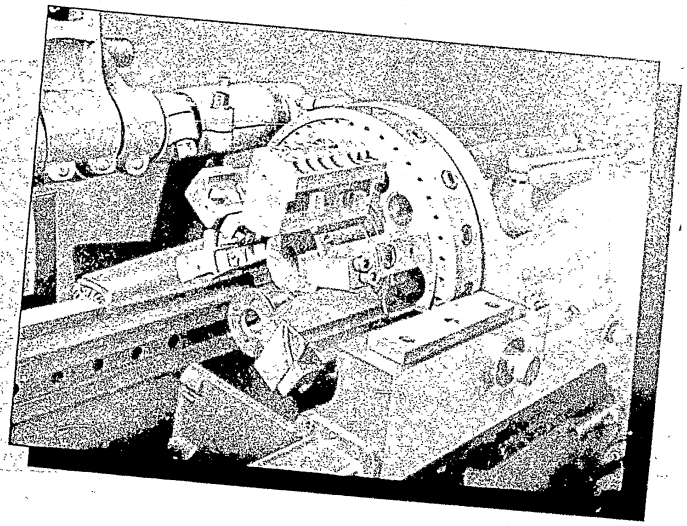
Arrangement of all feeds in geometric progression according to the proposal of ISA

Easy setting of tool to turning diameter required by means of micrometer cross feed stops (to be ordered according to our tool catalogue) and a hand wheel for the fine turret head cross feed. The hand wheel is provided with a sliding clutch The force by which the micrometer cross feed stop or the tool are pressed when the hand wheel is being turned does therefore not depend on the judgement or skill of the operator and the tool may be set easily and accurately and very fine tolerances may be kept on the work Low weight of machine (2600 kg or 5730 lbs) together with its high output, high speed, rigidity, and reliability in service is the result of the smaller external dimensions and the suitable arrangement of the mechanism within the machine.

Rich standard equipment of each machine includes in addition to a complete electrical and cooling equipment, also a pneumatic clamping cylinder with a hand distributor and all other fittings arranged for connection, on the one hand, to the pneumatic piping, on the other hand to the pneumatic chucking head or chuck or the pneumatic feed, which are available as special equipment

Rich choice of special equipment which can easily be fitted, even later, and which considerably widens the working range and output of the turret lathes.





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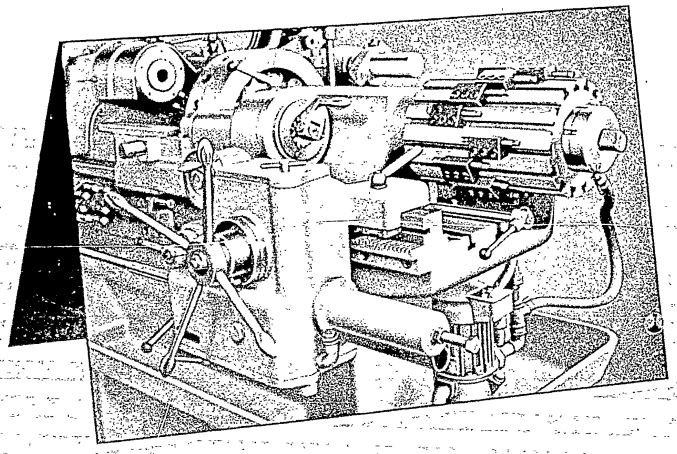


DESCRIPTION

Driven by reversible three-speed electric motor controlled by a single lever on the headstock, the same lever is also used for applying the main spindle brake.

With overall range of spindle speeds divided into seven ranges any one of which may easily and quickly be obtained by means of change gears supplied with the normal equipment of each machine.

High speeds of main spindle make it possible to use economically the most up-to-date cutting tools and, as a result, to reduce the costs of machining while the output is increased at the same time.

Even at the highest spindle speeds the machine works accurately, all its rapidly rotating parts being carefully balanced. Wide range (1 to 22.5) of individual groups of speeds permits, on the one hand, high cutting speeds for working with carbide tipped tools, on the other hand low cutting speeds e. g. for reaming or screw-cutting by means of tool or high-speed steel

Fine gradation of each speed ranges each with 10 speeds, are obtained by a total of four pairs of gears

Only two pairs of gears are in mesh for every spindle speed so that the machine runs smoothly and heating of the headstock is reduced to a minimum.

The main spindle is of extraordinary rigidity and runs without play in pre-loaded roller and ball bearings so that there are no vibrations, thus one of the main conditions for the accurate working of the machine is fulfilled

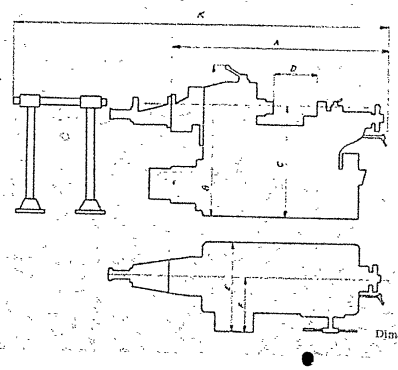
There are no clutches in the headstock (either for starting or stopping the machine or for changing speeds) As a rule such clutches generate heat and thus adversely affect the mechanism of the headstock

STANDARD EQUIPMENT (included in price of machine)

Electrical equipment of machine with main electric motor, electric pump with [illegible] and [illegible] pneumatic clamping cylinder with hand-control slide, air distributor, change gears, 3 step [illegible] for [illegible] sheet metal shields, set of spanners for attendance, grease gun, operating instructions

SPECIAL EQUIPMENT (supplied for machine at extra charge)

chucking head for bar stock	[illegible] for type A [illegible]
chucking head for blanks	[illegible] for type B [illegible]
pneumatic three-jaw chuck	[illegible] for [illegible]
pneumatic two-jaw chuck	[illegible]
control valve with pressure gauge	[illegible]
stock feed attachment	[illegible]
compressor set alternatively Vg 2	[illegible]
screwcutting attachment	[illegible]
automatic moving steady	[illegible]



	mm	in
A	343	13.5"
B	1145	45"
C	1065	42"
D	610	24"
E	1150	39.5"
F	610	24"
K	6156	

Dimensional drawing

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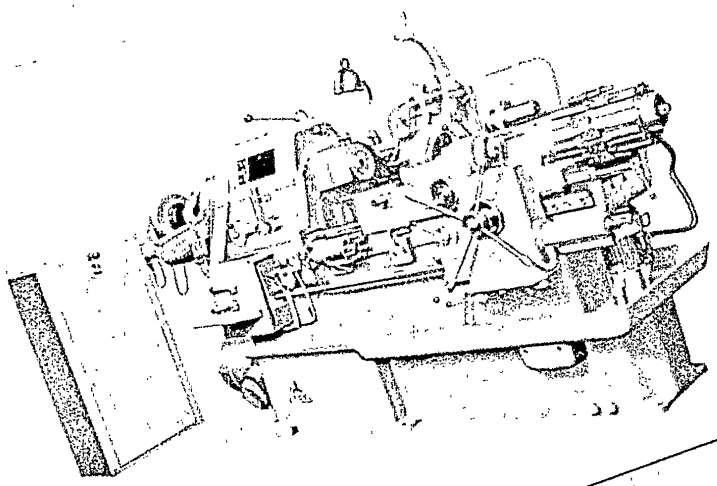

TURRET LATHE 60

TYPE

The machine is intended for the economical machining of steel as well as of alloys of non-ferrous and light metals. In its design particular attention was devoted to the requirement of fully utilizing cemented carbide tipped tools. The simple operation of this machine contributes to the reduction of non-productive times. Thus, for instance, bar stock is fed and chucked pneumatically. The machine works permanently with a high degree of accuracy and reliability.

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SPECIFICATIONS

		RT 26		RT 34	
Bar capacity	mm	26	1.02"	34	1.34"
Bore of spindle	mm	28	1.1"	36	1.41"
Taper in spindle	metric	30.5		40	
Swing over bed a) with thread chasing attachment	mm	225	8.8"	225	8.8"
b) without thread chasing attachment	mm	340	13.4"	340	13.4"
Max. chuck capacity	mm	110	4.3"	110	4.3"
Dia. of chuck	mm	110	4.3"	110	4.3"
Max. distance: a) turret to flange of work spindle	mm	440	17.3"	435	17.1"
b) turret to chuck for bar stock	mm	380	14.9"	375	14.7"
Dia. of turret	mm	200	7.9"	200	7.9"
Pitch line diameter of tool holes	mm	135	5.3"	135	5.3"
Number of tool holes		12	12	12	12
Diameter of tool holes	mm	15, 30, 35		15, 30, 35	
Longitudinal travel of turret slide	mm	440	17.3"	445	17.1"
Spindle speeds: Number		8	8	8	8
Range	r. p. m	375—4200		315—3500	
Number of feeds		3	3	3	3
Range of longitudinal feeds	mm/rev.	0.028—0.09		0.028—0.09	
Motor - Speed	r. p. m.	1500 3000		1500/3000	
Output	kW	3.6 2.6		3.6 2.6	
Floor space required	mm	850x1900	33.5"x75"	850x1900	33.5"x75"
Length of machine with stock feeding attachment and floor stands	mm	4540	178"	4540	178"
Weight of machine with standard equipment	kg	950	2100 lbs	950	2100 lbs.
with packing	kg	1100	2420 lbs	1100	2420 lbs.
with seaworthy packing	kg	1175	2600 lbs.	1175	2600 lbs.
Contents boxed	m³	3.2	113 cu. ft	3.2	113 cu. ft.

OPTIONAL EQUIPMENT RECOMMENDED TO EACH MACHINE:

For RT 26	For RT 34	
Va	Vk	Out-balancing chuck for bar stock
Ve	Vf	Stock feeding attachment
Vg	Vi	Short stock tube with floor stand
Vp		Longitudinal copying attachment
Vs		Multi-drum for copying attachment
Vr		Central stop
Vt		Left-hand cross stop
	Vt	Right-hand cross stop
	Vv	Transverse copying attachment including holder of copying roller
	Vy	Drum length stop
	Vz	Special stop
	Vza	Cooling attachment
	Vga	Change gears

OPTIONAL EQUIPMENT USED RATHER FREQUENTLY:

Vie	Change turret
Vae	Turret puller
Vae	Thread chasing attachment
Vca	Thread cutting with die-head (if thread chasing attachment not available)
Vba	Thread cutting with die-head (if thread chasing attachment available)

OPTIONAL EQUIPMENT MADE AND SUPPLIED ON REQUEST ONLY:

Vla	Multiple thread cutting attachment (if thread chasing attachment is not available)
Vae	Supporting tailstock for machines without thread chasing attachment
Vae	Oil supply to the turret
Vla	Cooling oil injection — if supporting tailstock not available
Vha	Cooling oil injection — if supporting tailstock available
Vas	Clamping chuck for accurate centering and small diameter stock
Vle	Change pulley for feed changing
Vas	Backplate with 3-jaw chuck dia. 100 mm

For turret tool-holders see special list.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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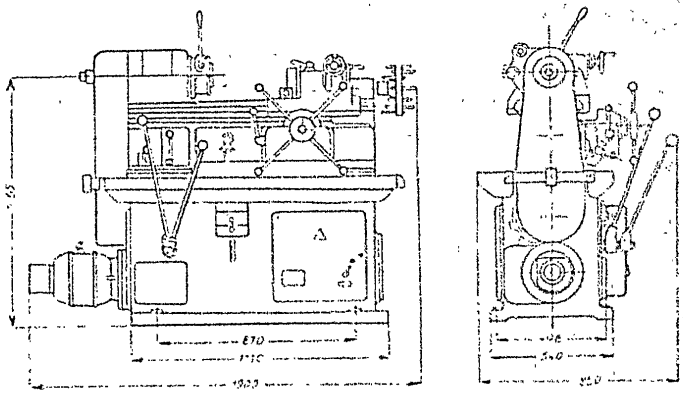

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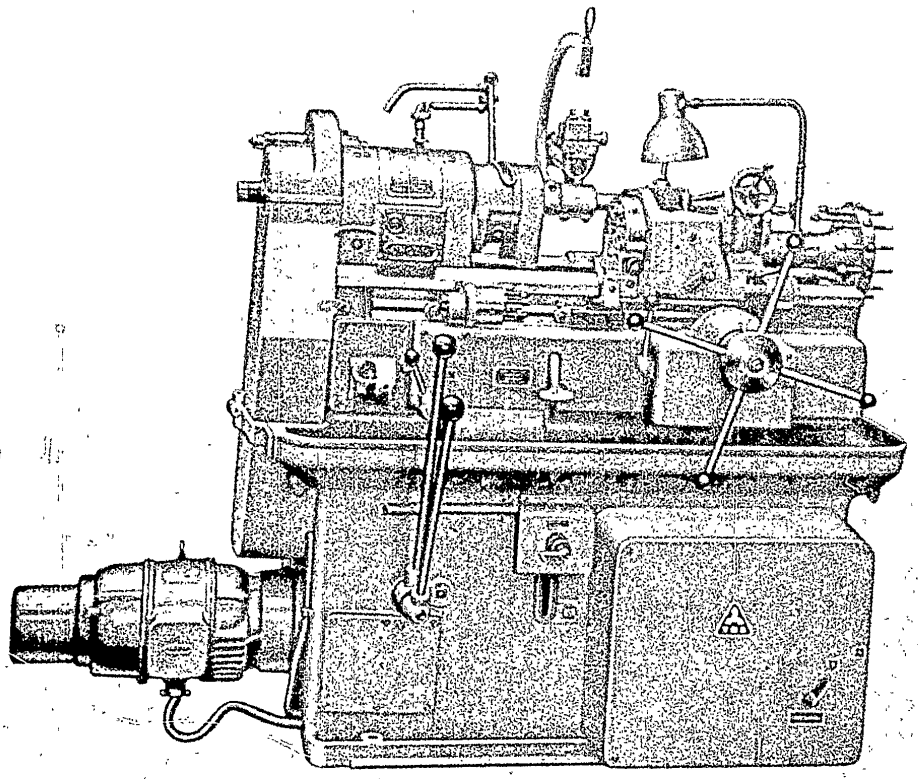

TURRET LATHES Models RT 26-34

Heavy Duty High Speed Precision Machines for the quantity production of parts from bar stock, as well as for the single part production, designed and built to take full advantage of hard alloy cutting tools

THE WORK SPINDLE is driven by V-belts through the gearbox from a flange-mounted two-speed motor. Four multiple disc clutches in the gearbox and the pole changing switch of the main drive motor enable the engaging of four spindle speeds in either direction of rotation while the machine is cutting. Two different spindle speed ranges are obtained by employing two change gears. The work spindle runs in accurate, finely adjustable anti-friction bearings.

THE FEED MECHANISM is driven by a V-belt from the work spindle and consists of the quick change gearbox and the apron with a tripping worm.

TURRET SLIDE. The turret has twelve tool holes and rotates about its horizontal axis. The longitudinal feed is by hand and by power with automatic release. The cross feed is only by hand and proceeds by the rotary movement of the turret. Adjustable stops are provided for limiting the longitudinal and cross feed of the tools.

THE STOCK FEEDING ATTACHMENT is operated by a hand lever. The feeding collet has interchangeable jaws to suit the different bar dimensions.

THE THREAD CHASING ATTACHMENT enables the cutting of all classes of external and internal threads with the aid of a leader.

LUBRICATION. All gears in the gearbox and apron are lubricated by a gear pump, the work spindle bearings by a hand grease gun. The turret slides and the other movable parts are lubricated by a hand pump.

COOLING. The coolant tank is housed inside the machine base. The coolant is supplied by a gear pump.

STANDARD EQUIPMENT:

2 guards, central and side cross stops, set of spanners, hand grease gun, electric motor for 220, 380 or 500 volts, electrical equipment, spot light, operator's instruction booklet and operating plates.

TOS

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SPECIFICATION

Chucking Range:			
Maximum chucking diameter:			
for bar stock	mm	34	1 11/32"
for blanks in a chuck (for work with a smaller number of tools)	mm	110 to 180	4 21/32" to 7 3/32"
Diameter of chuck (Vc 1 or Vc 2)	mm	160	6 19/32"
Maximum swing over bed:			
with thread chasing attachment	mm	250	9 27/32"
without thread chasing attachment	mm	360	14"
Maximum distance:			
turret head to main spindle flange	mm	510	20"
turret head to chuck for the bar stock	mm	410	16"
Turret Head:			
Diameter of pitch circle of tool holes	mm	150	6"
Number of tool holes		16	
Number × diameter of tool holes	mm	7×20	7×25/32"
	mm	7×30	7×1 5/16"
(double hole)	mm	(2×35)	(2×1 3/8")
Maximum longitudinal travel of turret slide	mm	410	16"
Speeds:			
Number of speeds (forward and reverse)		50	
Speed ranges (set by change gears supplied as standard equipment of machine:			
No. I range (with 10 steps)	r. p. m.	56 to 1250	
No. II range (with 10 steps)	r. p. m.	71 to 1600	
No. III range (with 10 steps)	r. p. m.	90 to 2000	
No. IV range (with 10 steps)	r. p. m.	125 to 2500	
No. V range (with 10 steps)	r. p. m.	140 to 3150	
Feeds:			
Number of longitudinal and cross feeds		6	
Range of longitudinal feeds	mm per rev.	0.056 to 0.56	
	inches per rev.		0.0022" to 0.022"
Range of cross feeds	mm per rev	0.028 to 0.28	
	inches per rev.		0.0011" to 0.011"
Main Three Speed Electric Motor:			
Permissible number of reversals (at 670 or 680 r. p. m.)	per hour	120	
Speed	r. p. m.	680 to 2800	
Maximum output at full utilization of machine	kW	9	
Dimensions and Weights:			
Floor space (without stock feed attachment)	mm	2250×950	8'1"×3'1"
Length of machine with stock feed attachment and stands for guiding bar stock	mm	5550	18'2"
Height of centre-line of spindle above floor	mm	1000	3'4"
Weight of machine with standard equipment	kg	1300	2870 lbs

Standard Equipment included in the price of the machine:
Electric equipment of machine with main electric motor, coolant pump motor, centrifugal pump with piping and two nozzles, pneumatic clamping cylinder with hand-controlled air distributor, change gears, 3 stops for cross feed, 3 sheet metal shields, set of spanners for attendance, grease gun, instructions for operation and setting, precision test certificate.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

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Examples of Products of the Type RN 36 Machine

RN 36

Free cutting steel 9G20 K
4.73 min.

Steel 1423O
2.71 min.

Steel CBK
4.25 min.

Steel 11500 T
5.43 min.

Steel 11500
6.58 min.

Steel 11500
9.43 min.

Steel 11500
7.58 min.

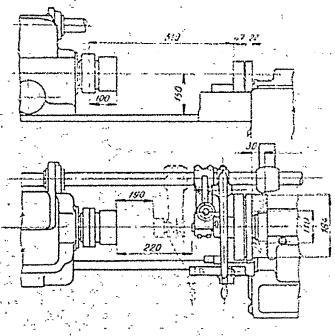
Steel 11500
3.42 min.

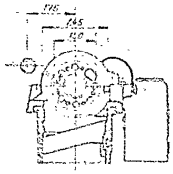
Steel 11500
6.47 min.

Free cutting steel 9G30 K
3.84 min.

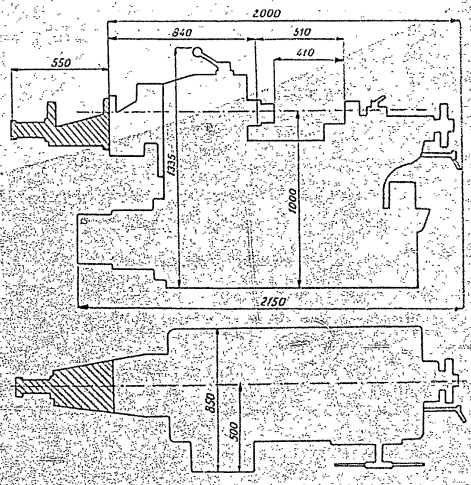
Free cutting steel 9
3.84 min.

Working space between headstock and turret slide (with thread chasing attachment)





Dimensional Drawing of Machine



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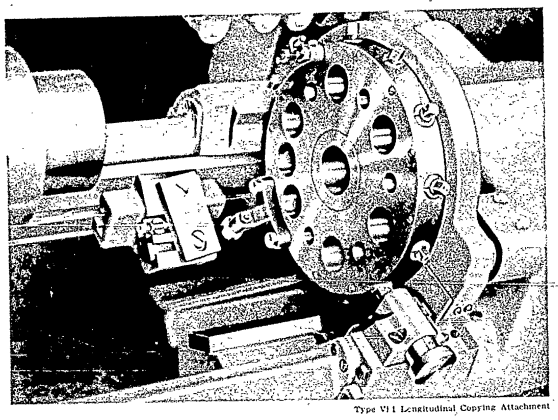
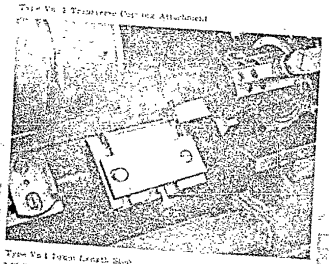
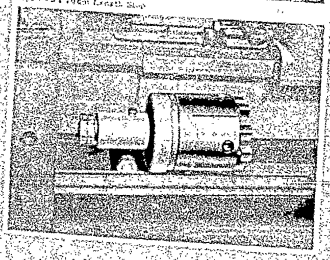


Type Vl 1 Longitudinal Copying Attachment

Type Vm 1 Transverse Copying Attachment



Type Vn 1 Drum Length Stop



The Type Vl 1 Longitudinal Copying Attachment

consists of a bracket adjustable on the inside rear surface of the bed, and carrying a hardened guide ruler the angle of which is adjustable according to the taper to be turned. The turret head is guided along the set guide bar by a copying pin clamped in a holder attached to the face of the turret head. The guide bar is straight (form bars are only furnished at an extra charge) and 125 mm (4¹⁵/₁₆") long. The maximum taper for which the guide bar can still be set is 15° either way.

The Type Vm 1 Transverse Copying Attachment

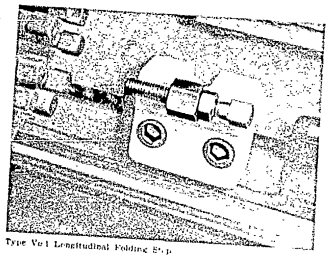
is intended for turning the face of the work-piece. It is built and attached in a similar manner as the longitudinal copying attachment. However, instead of the copying pin a copying roller is fitted in the holder on the face of the turret head. The guide bar is straight (a curved bar is only supplied at an extra charge) and can be set for angles up to 20° either way. It is 75 mm (2¹⁵/₁₆") long.

The Type Vn 1 Drum Length Stop

is bolted to the front wall of the bed and serves for limiting or disengaging the longitudinal power feed of the turret slide. It is provided with eight finely adjustable stop screws which can be set for different lengths so that they limit the longitudinal movement of the turret head at different distances corresponding to the individual operations.

The Type Vo 1 Longitudinal Folding Stop

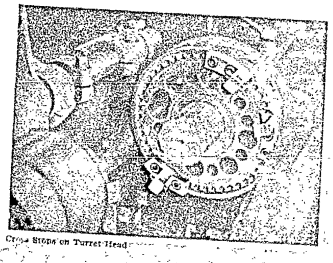
is fitted in a similar position as the drum length stop but has only one stop screw limiting or disengaging the longitudinal feed of the turret slide. If not used the stop need not be removed but can merely be folded away so that the turret slide with the apron may pass it.



Type Vo 1 Longitudinal Folding Stop

The Turret Head, Type Vp 1 with Holder, Type Vr 1 without Holder

is only provided with precision drilled tool holes if it is supplied together with the turret lathe with which it is to be used. If it is furnished later, its tool holes are only rough drilled and are only finished to accurate dimensions after the turret head has been mounted on the machine where it is to work permanently. In such a case a drawing is sent with the turret head containing all necessary dimensions for finishing the tool holes, as well as directions for fitting and removing the turret head.



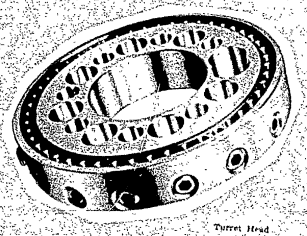
Cross Stops on Turret Head

Cross Stops

for limiting or disengaging the cross feed of the turret head have to be ordered according to the tool catalogue. The following are supplied as standard equipment of the turret lathe 1 symmetrical, 1 right-hand and 1 left-hand cross stop. In addition micrometer cross stops are available to special order. These stops are provided with a micrometer screw and permit the tool to be set accurately for the required turning diameter and the closest limits to be easily maintained. This eliminates, in many cases, subsequent grinding of the workpiece. Micrometer right and left-hand cross stops are available, either lateral or symmetrical.

Lighting of Machine

A spot light with joints provided with a switch is fitted to the rear wall of the machine. It can be adjusted to any position found to be most favourable for the work. For reasons of safety a voltage of 24 Volts is used for lighting. This voltage is obtained from the standard mains voltage by means of a transformer fitted in the contactor box (separate from the machine) where the contactors and the main switch are centralized. The contactor box is connected to the terminal board fitted on the rear part of the machine.



Turret Head

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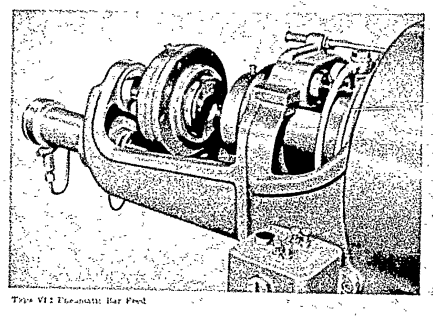


Type Vf 1 Pneumatic Bar Feed

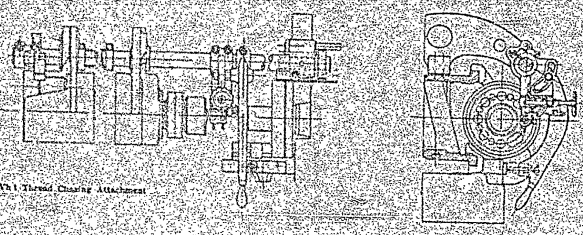
ing, no later relaxation of the gripping force because the gripping power continues even during the turning work.

The Type Vf 1 Pneumatic Bar Feed

is fitted to the turret lathe at the rear of the pneumatic clamping cylinder; it is controlled by the same hand lever of the air distributor as the chucking heads or chucks. When this lever is moved to its middle position the gripping jaws of the chuck are released, the bar is gripped by the feeding jaws and moved forward by the length required. The feed operates fast and, as it is independent on the main spindle speed, it works reliably even at the highest speeds of the machine. When the hand lever of the distributor is moved to its extreme position the gripping jaws of the chucking head or chuck grasp the bar and the released feeding jaws return to their original position. The feeding jaws permit feeding of bars the diameter of which differs as much as ± 1 mm from the rated bore of the feeding jaws; they are easily interchangeable and leave no traces of gripping on smooth drawn bars. The bars can be used up completely, i. e. without unused short pieces. Normally (unless specified otherwise in the order) jaws with a bore of 34 mm are supplied with the feeding attachment.
(Other cross sections of feeding jaws are listed in the tool catalogue). In addition, the following parts are furnished with the feeding attachment: three interchangeable sockets for guiding the feed bars within the main spindle (only one of which is inserted at any time according to the diameter of the bar being machined). Guiding of the stock in a noiseless tube has to be separately specified in the order.

The Type Vg 1 Compressor

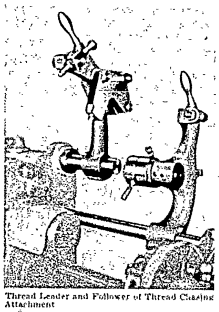
for providing the compressed air necessary for chucking and feeding can be supplied, when ordered, together with the turret lathe. A turret lathe equipped with this compressor forms a completely independent unit and is especially suited for plants where there is either no compressed air at all or air of a low pressure (about 6 atm. or 85 psi are required). The compressor is driven by its own electric motor forming a part of and supplied with the compressor set, same as the fan, the necessary valves and switches. The consumption of compressed air for one of the chucking heads or chucks and for the bar feed is approximately 1 cu. metre (35 cu. ft.) per hour at a pressure of 6 atm. (85 psi) and a temperature of 20° C (68° F) [i. e. 6 cu. metres (210 cu. ft.) per hour] of air at normal atmospheric pressure. This consumption figure is based on 60 clamping and feeding operations per hour.



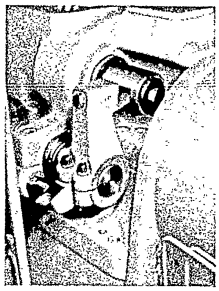
Type Vh 1 Thread Chasing Attachment

The Type Vh 1 Thread Chasing Attachment

serves for cutting male as well as female threads, both right hand and left hand. It is also suitable for cutting fine (low pitch) threads. A different leader with the corresponding follower has to be used for every pitch. As a rule (unless specified otherwise in the order) a leader and follower for a pitch of 1 mm is supplied with the attachment. Thread leaders and followers for other pitches are listed in the tool catalogue according to which they may be ordered.
As the drive of the attachment has a ratio of 1 to 2 the pitch of the lead must be twice as great as the pitch of the thread to be cut on the work piece. When the end of the thread is reached the follower can be automatically disengaged by means of adjustable stops and the attachment returned to its original position. The thread chasing attachment is rigid enough to be used for cutting with carbide tipped tools (even in very hard material) both male and female threads, but the latter only if the diameter of the hole is greater than 30 mm.



Thread Leader and Follower of Thread Chasing Attachment



Type Vh 1 Thread Chasing Attachment

The Type Vi 1 Automatic Moving Steady

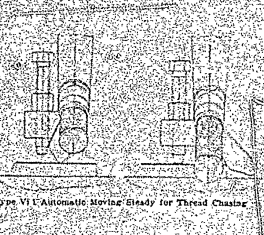
for thread chasing is useful for cutting threads with cemented carbide tipped tools. Its advantages are the following:

1) Elimination of the strain of the operator who previously had to follow the tool moving through the thread in order to catch the arm in time to stop it from dropping back.
2) Reliable movement out of the thread which is automatic as well as automatic movement of the arm into the working position.
3) Economy resulting from a longer life of tools and saving of time.
4) Easy fitting-fitted to the arm in place of the standard handle.

It is recommended to order the automatic moving steady as a supplement to the type Vh 1 thread chasing attachment. The appropriate tool holder may be ordered according to the tool catalogue.

The Arm for Type Vj 1 Die Heads

is attached to the guide shaft of the thread chasing attachment in place of the tipping arm with the thread chasing slide which must first be removed. It is therefore recommended to order the arm for the die heads as a supplement of the thread chasing attachment. The die heads (which open automatically when the cut is completed) serve for cutting accurately concentric male threads and are clamped to the arm either directly or by means of suitable reducing sleeves, depending on their size. Work with the thread chasing attachment as well as with this arm can be done quite independently of the turret slide.
In case the customer does not possess a type Vh 1 thread chasing attachment, the type Vk 1 arm has to be ordered.



Type Vi 1 Automatic Moving Steady for Thread Chasing

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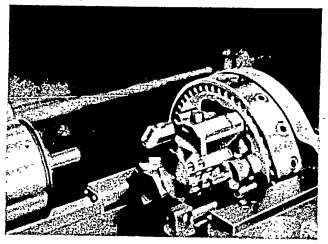
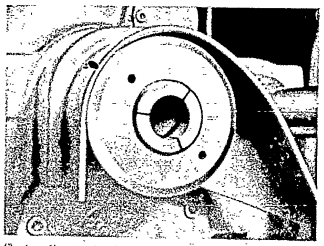


Support of Tool Holders by End of Turret Head Shaft



Chucking Head for Bar Stock

Simple but reliable protection of the longitudinal and cross feed mechanism against overload by means of the above described automatic disengagement of the longitudinal and cross feeds which cannot fail, as opposed to the usually employed protective clutches the reliability of which depends on correct adjustment and attendance.

Simple engagement and disengagement of cross feed by a simple downward movement of the crank without any further movement.

Protruding front end of turret head shaft designed to support the tool holders, in order to prevent them from vibrating, when turning with cemented carbide tipped tools, even with the heaviest chips.

Oil-tight feed box and apron. The parts of the feed mechanism contained therein are abundantly lubricated either automatically or by means of a hand pump so that there are only few points requiring separate additional lubrication. This simplifies the attendance, reduces the oil consumption as well as the wear of the parts, and prolongs the precision of the machine.

Arrangement of all feeds in geometric progression according to the proposal of ISA.

Easy setting of tool to turning diameter required by means of micrometer cross feed stops (to be ordered according to our tool catalogue) and a hand wheel for the fine turret head cross feed. The hand wheel is provided with a sliding clutch. The force by which the micrometer cross feed stop or the tool are pressed when the hand wheel is being turned does not therefore depend on the judgement or skill of the operator, and the tool may be set easily and accurately and very fine tolerances may be kept on the work.

Small weight of machine (1200 kg or 2570 lbs) together with its high output, high speed, rigidity, and reliability in service is the result of the smaller external dimensions and the suitable arrangement of the mechanism within the machine.

Numerous standard equipment of each machine, includes, in addition to a complete electric and wet turning attachment, also a pneumatic clamping cylinder with a hand distributor and all other fittings arranged for connection to the pneumatic piping on the one hand, and to the pneumatic chucking head or chuck or the pneumatic feed, which are available as special equipment on the other hand.

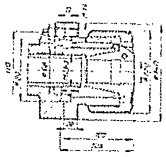
A rich choice of special equipment which can easily be fitted, even later, and which considerably widens the working range and output of the turret lathes.

The pneumatic chucking head for bar stock contains hardened and ground three-part jaws which are closed pneumatically. The compressed air is admitted into the pneumatic clamping cylinder screwed to the rear end of the main spindle by operating the hand lever of the air distributor. The pressure produced in the cylinder is transmitted to the chucking head through the connecting tube. The jaws suitable for bar stock (accurately drawn or rolled only, but straightened) with a round, square or hexagonal cross section permit clamping of stock up to 1 mm bigger or smaller than the rated bore. The jaws are easy to replace when the nut union is unscrewed. Normally (unless specified otherwise in the order) jaws for a diameter of 34 mm are supplied with the chucking head.

The chucking head is perfectly balanced and about 30 per cent shorter than conventional hand-operated collet bar chucks so that it is free from vibrations even with the heaviest chips and highest speeds. The chucking head can easily be detached from the main spindle and dismantled for cleaning purposes within a few minutes.

The Type VB 1 Pneumatic Chucking Head for Blanks

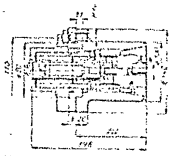
serves for chucking workpieces already parted off or blanks which have already been machined at the end where they are to be chucked and which shall only be machined at the other end. In order to chuck the work in the direction of its axis always exactly in the same position the work rests either on the internal stop adjustable in advance and supplied with the chucking head, or, in the case of work provided with a collar, on an external stop. The latter is not supplied with the chucking head. The gripping power developed by the pneumatic clamping cylinder pulls, by means of a connecting tube, the chucking collect of the chucking head and thus closes the jaws within the collet. These jaws permit the chucking of work the dimensions of which differ by as much as 0,3 mm from the rated bore of the jaws; they can easily be changed by unscrewing the collet in which they are inserted. The biggest bore of the jaw is 38 mm. The three part jaws supplied with the chucking head (one per chucking head) are — unless otherwise specified in the order — only rough drilled to 10 mm and not hardened. Further jaws of this kind may be furnished to order; they must be finished to the required diameter of work on the machine on which they are to work.



Type Va 1 Pneumatic Chucking Head for Bar Stock

The Type Vc 1 Pneumatic Three Jaw Chuck

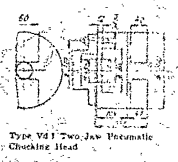
is normally supplied with a set of hardened gripping jaws which are easily interchangeable and reversible so that the work can be gripped by the same jaws either from inside or from outside. A set (1 × 3) of unhardened jaws can be supplied to order. Hardened jaws are suitable for chucking work with a rough surface, while unhardened jaws are used for accurate chucking of finely finished work. Although these three jaw chucks are especially suited for accurate concentric chucking of parted off pieces, castings, and pressed parts they may also be used for chucking bar stock which may be of great advantage when changing from blanks to bar work. Work with a difference in diameter of less than 8 mm can be chucked without adjusting the jaws, for larger diameters adjustment is necessary; however, it is easy to make by loosening the screws provided in the jaws. The gripping force developed, in this case also, by the pneumatic clamping cylinder mounted at the rear of the main spindle is transmitted to the jaws by means of a connecting tube and a system of levers and can be adjusted by an air pressure control valve which can be furnished as special equipment.



Type Vb 1 Pneumatic Chucking Head for Blanks

The Type Vd 1 Pneumatic two Jaw Chuck

serves mainly for gripping angular and irregular work, e. g. fittings. It is provided with interchangeable unhardened gripping jaws which must eventually be adapted to the chucked work. The interchangeable gripping jaws rest upon basic jaws which have a sufficiently large stroke and on which they can be accurately adjusted. Otherwise the two jaw chuck resembles the three jaw chuck as described above.



Type Vd 1 Two Jaw Pneumatic Chucking Head

Diagram of Pneumatic Machine Equipment

The Type Ve 1 Air Pressure Control Valve

with pressure-gauge is fitted on the outside of the machine so that it is within easy reach of the operator. This valve serves for setting the chucking force according to the size and the thickness of the walls of the chucked work, so that it will be chucked firmly but without distortion. There is, with pneumatic chucking as opposed to hand chuck-

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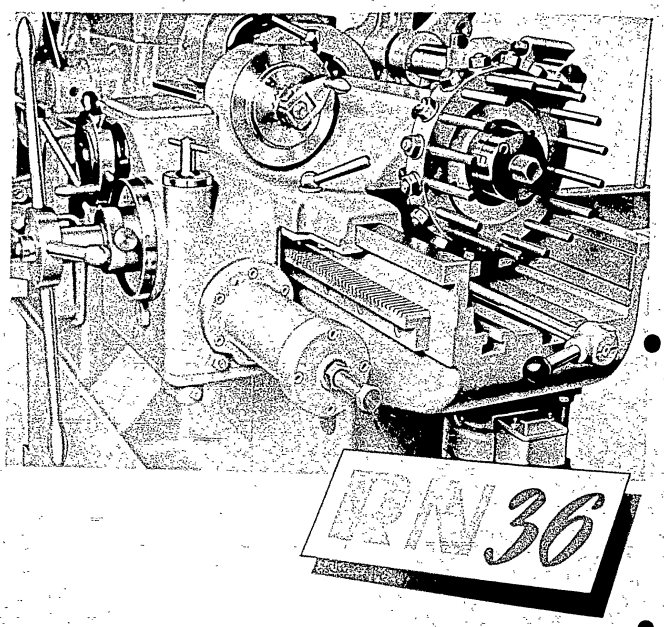


The Type RN 36 Turret Lathe is intended for the economical machining of steel as well as of alloys of non-ferrous and light metals. In its design particular attention was devoted to the requirement of fully utilizing cemented carbide tipped tools. The simple operation of this machine contributes to the reduction of non-productive times. Thus, for instance, bar stock is fed and chucked pneumatically. The machine works permanently with a high degree of accuracy and reliability.

Characteristic Features and Advantages of the Type RN 36 Turret Lathe

Drive by reversible three-speed electric motor controlled by a single switch lever on the headstock; the same lever is also used for applying the main spindle brake.

Wide overall range of spindle speeds divided into five ranges any one of which may easily and quickly be obtained by means of change gears supplied with the normal equipment of each machine. High speeds of headstock spindle make it possible to use economically the most up-to-date cutting tools and, as a result, to reduce the costs of machining while the output is increased at the same time. Even at the highest spindle speeds the machine works accurately, all its rapidly rotating parts being carefully balanced. Wide range (1 to 22,5) of individual groups of speeds permits, on the one hand, high cutting speeds for working with carbide tipped tools, on the other hand low cutting speeds e. g. for reaming or thread chasing by means of tool or high-speed steel. Fine gradation of each speed range, the 10 different speeds of which are obtained by a total of four pairs of gears.

Only two pairs of gears are in mesh for every spindle speed so that the machine runs smoothly and heating of the headstock is reduced to a minimum.

The headstock spindle is of extraordinary rigidity and runs without play in pre-loaded roller and ball bearings so that there are no vibrations; thus one of the main conditions for the accurate working of the machine is satisfied.

There are no clutches in the headstock (either for starting or stopping the machine or for changing speeds). As a rule such clutches generate heat and thus adversely affect the mechanism of the headstock.

Headstock is provided with large bearings outside the guideways of the bed so that the forces acting on the headstock spindle are transmitted to the bed without any distortions.

Main spindle brake located outside the headstock so that its efficient cooling is ensured; therefore the heat generated by braking causes no heating of the headstock mechanism.

Good suction of oil.

The oil pump is submerged and placed so low that, should any leakage develop later, it cannot affect the adequate supply of lubricating oil.

Lubrication of headstock by ordinary engine oil which is also used for all other assemblies of the machine so that only this single grade of lubricant is required for the entire machine.

Accurate disengagement (within 0,02 mm) of the longitudinal power feed in the direction of the headstock either by means of adjustable stop pins of the stop drum on the turret slide, or by a drum length stop which is supplied as special equipment of the machine and fixed on the front side of the bed, or by means of a simple folding stop. Before the final disengagement of the feed the turret slide is pressed, during a few revolutions of the headstock spindle, by a force which, to a certain extent, is adjustable, against the stop so that, once the automatic feed is disengaged, it is no longer necessary to finish turning to an accurate length by the hand feed, continuously watching the indicator.

Accurate disengagement (within 0,02 mm) of the cross power feed of the turret slide forward and backward by means of adjustable cross stops, three of which are supplied as standard equipment with each machine; this accurate disengagement makes it possible to strictly maintain the closest limits.

Simple cross feed drive which is obtained from the longitudinal feed in the shortest way simplifies the operation of the mechanism and reduces the oil consumption.

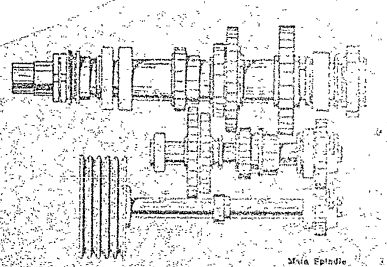
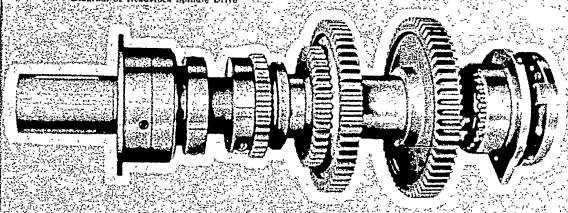


Diagram of Headstock Spindle Drive



Main Spindle

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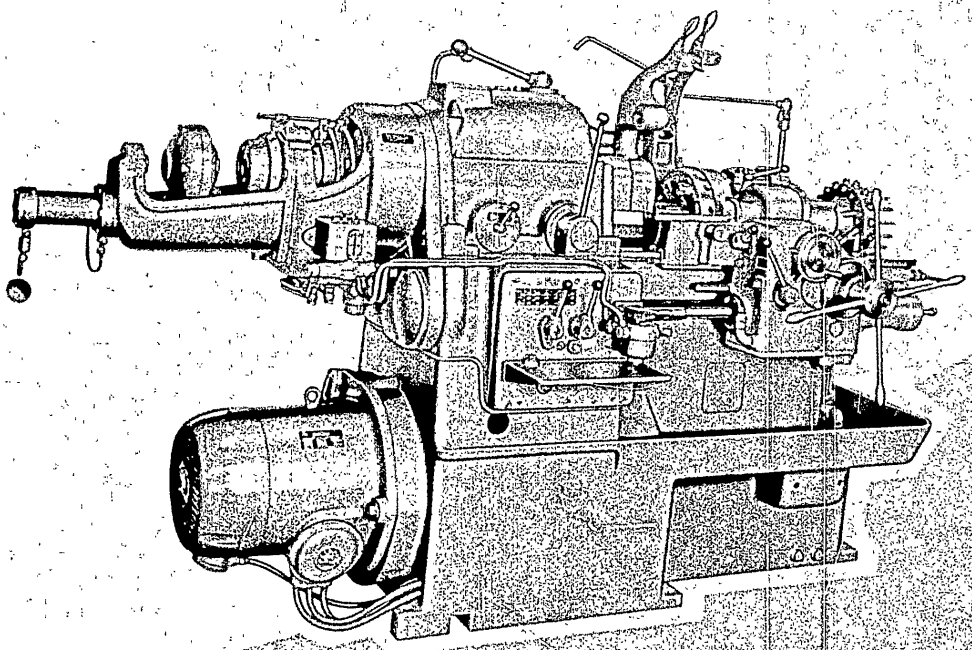
TURRET LATHE



TYPE

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S P E C I F I C A T I O N :

MAIN DIMENSIONS:			
Height of centres over bed	mm	230	9 1/16"
Maximum turning diameter over covers of bed guideways	mm	510	20 1/16
Maximum turning diameter over turret slide	mm	450	17 3/4"
Maximum turning diameter over cross slide	mm	255	10"
Maximum distance, spindle nose to turret	mm	750	29 1/2"
Maximum distance, chuck to turret	mm	590	23 1/4"
Diameter of self-centering chuck	mm	190—240	7 1/2"—9 1/2"
Diameter of collet chuck	mm	225	8 7/8"
Width of bed	mm	400	15 3/4"
SPINDLE:			
Bore, dia	mm	53	2.1"
Maximum size bar stock handled: round	mm	50	2"
hexagonal	mm	41	1 5/8"
square	mm	35	1 3/8"
Spindle taper	Morse	6	6
Flange according to DIN 812, dia	mm	100/175	3.937"/6.889"
SPINDLE SPEEDS:			
Speeds in both directions		18	
Range of speeds	r. p. m.	28 ... 1400	
Ratio of geometrical progression		1.26	
SADDLE AND CROSS SLIDE:			
Longitudinal travel of saddle	mm	660	26"
Travel of cross slide	mm	250	9 7/8"
Number of power feeds		12	
Range of longitudinal and cross feeds	mm/rev.	0.045—2	0.002"—0.08"
Dimensions of four-way tool block	mm	147 X 147	5 13/16" X 5 13/16"
Dimensions of tools for four-way tool block	mm	34 X 25	1 3/16" X 1"
TURRET:			
Size of turret across flats	mm	260	10 1/4"
Dimensions of clamping surface	mm	113 X 140	4 7/16" X 5 1/2"
Number of clamping surfaces and holes in turret		6	
Diameter of holes in turret	mm	54	2 1/4"
Turning length	mm	250	9 7/8"
Number of feeds		12	
Range of feeds	mm/rev	0.045 ... 2	0.002 ... 0.08 in. per rev.
TAPER TURNING AND COPYING ATTACHMENT:			
Taper turning length	mm	300	11 7/8"
Maximum angle of taper		20°	
Length of shape turned according to template	mm	300	11 7/8"
Depth of shape turned according to template	mm	35	1 3/8"
SCREWCUTTING BY THREAD LEADERS:			
Number of metric threads		14	
Pitch range of metric threads	mm	1—7	
Number of Whitworth threads			14
Pitch range of Whitworth threads ... threads per inch			4 ... 19
Length of thread cut	mm	100	4"
Number of thread leaders for metric threads		14	
Number of thread leaders for Whitworth threads			14
DRIVE:			
Flange mounted electric motor 1430 r. p. m.	kW/HP	7.5/11.5	
Electric motor for coolant pump 2600 r. p. m.	kW/HP	0.125/0.17	
Capacity of coolant pump at 0.3 atm. (4.4 lbs per sq. in.)	litres per min.	20	
	galls per min.		4.4
DIMENSIONS AND WEIGHTS:			
Floor space required	mm	3000 X 1400	118" X 55"
Floor space required by machine with bar feed	mm	4060 X 1400	160" X 55"
Height of lathe	approx. mm	1555	61 3/4"
Net weight with standard equipment and motor	approx. kg	1800	lbs 3960
Weight of electric motor 7.5 KW	approx. kg	85	lbs 187
Weight of electric motor driven coolant pump 0.125 kW	approx. kg	12	lbs 26
Weight of electrical equipment, motors excluded	approx. kg	11	lbs 24
Weight of ordinary packing	approx. kg	300	lbs 660
Weight of seaworthy packing	approx. kg	400	lbs 880
DIMENSIONS OF PACKING:			
Length, width and height	approx m	2,62 X 1,3 X 1,49	8.7" X 4.3" X 4 9/16
Volume of packing	approx. m³	5.1	cu ft. 180

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

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2 RP 113.4½ WL stands for 2 followers for cutting left hand Whitworth threads with 4½ threads per inch.

1 RP 112 screwcutting leader and 1 RP 113 follower for cutting right hand metric threads with a pitch of 2 mm are supplied as standard equipment of the attachment. This follower and leader are included in the price of the attachment.

RP 121 automatic stock feed mechanism with safety tube push bar and feeding head. This is an essential supplementary item for bar work. We supply the machine with this mechanism if required by the customer. The rear feeding head is arranged to swivel in order to facilitate the insertion of the bar stock also from the front of the machine. The feeding head sliding on guide bars is pulled into the spindle with the bar stock either automatically by a weight or by means of a star wheel. When the feeding head reaches its extreme position (near the spindle) it is returned to the initial position by turning the star wheel backward. For the forward movement toward the spindle the screws holding the material are clamped by hand, for the return movement they are released. For bars with a smaller diameter than 24 mm (1") and for more reliable feeding a tube is fixed in the feeding head provided with a pin which presses against the end of the bar during the feeding movement. The bar can be fed through the spindle to the chuck by means of the push bar until it is used up completely. The following items are supplied with the automatic stock feed mechanism: A safety cover of the feed mechanism, a rough finished flange for mounting a 190 or 240 mm (7½" or 9½") dia self-centering chuck, a RP 132 three- or four-jaw, 190 or 240 mm (7½" or 9½") dia self-centering chuck and a chuck guard for the prevention of splashing of the coolant.

RP 141 quick-acting collet chuck. This is a further essential supplementary item for bar work. The collets for the chuck are exchanged to suit the shape and diameter of the stock. They are supplied for all standard sizes of only bright drawn round, hexagonal and square stock. The exchange of the collets in the chuck is very simple and quick. The accurate gripping diameter of the chuck can easily be adjusted by means of a nut at the front of the chuck.

Standard Collets

Designation	For stock	mm dia													
RP 142	round	10	12	14	16	18	20	22	25	27	30	35	40	45	50
RP 143	hexagonal	8	9	11	14	17		22		27	32	36	41		
RP 144	square	10		15			20		25		30	35			

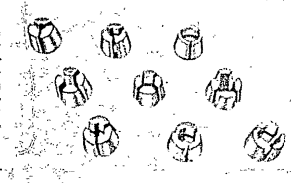
The following collets are supplied for machining inch size stock:

Designation	For stock	in. dia.
RP 142	round	5/16 3/8 7/16 1/2 9/16 5/8 11/16 3/4 13/16 7/8 15/16 1 1 1/16 1 1/8 1 1/4 1 3/8 1 1/2 1 5/8 1 3/4 2
RP 143	hexagonal	5/16 3/8 1/2 5/8 3/4 7/8 1 1 1/4 1 1/2
RP 144	square	5/16 3/8 7/16 1/2 9/16 5/8 3/4 1 1 1/16 1 1/4 1 1/2

Other collets for sizes not mentioned above can only be supplied to special order. The collets are made of high grade steel, carefully hardened and precision ground. A single gripping is used for the grinding operation, by which a high precision is achieved and possible distortions caused by hardening are eliminated. Three-split collets are used for round and hexagonal stock, four-split ones for square stock. Please specify the quantity, RP designation and diameter in your order, for instance:

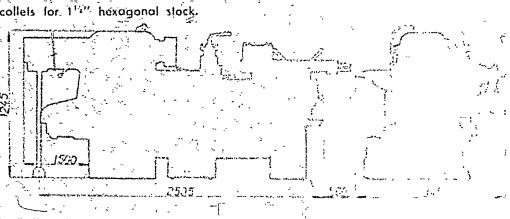
1 RP 142.20 stands for 3 collets for 20 mm dia round stock.

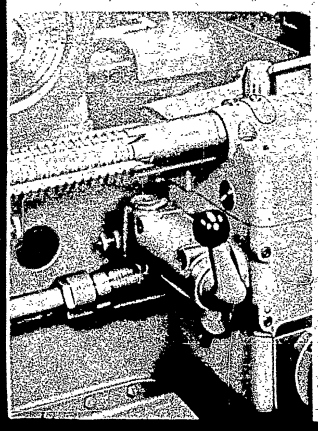
2 RP 143.1¼ stands for 2 collets for 1¼" hexagonal stock.

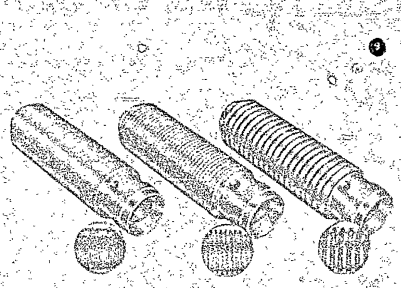


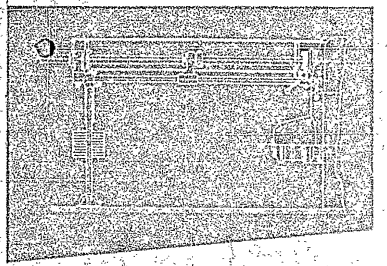
One RP 142.50 collet, which is included in the price of the chuck is supplied as standard equipment.

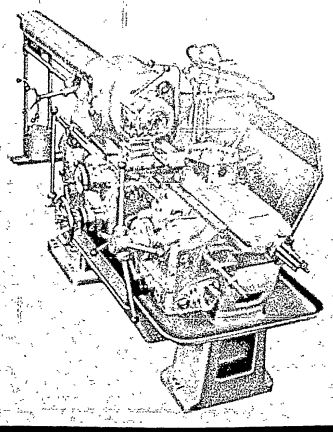
Collets of the older type RS 50 machine can be used with the type R 5 capstan lathe.











For equipment for bar and chuck work and for special equipment for various jobs please refer to the special catalogue:
"Equipment for Type R 5 Capstan Lathe"

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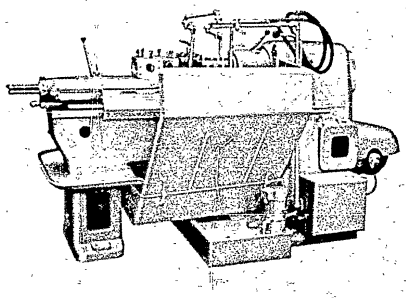
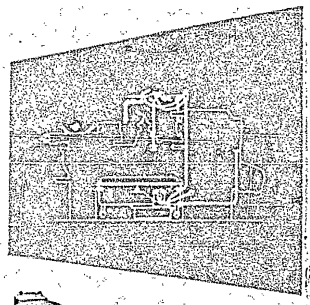
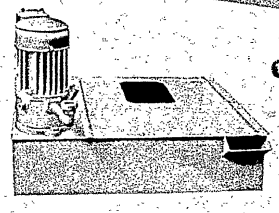






pipes one of which is fixed while the other moves with the slide. The joints arranged in the pipe line enable the direction of the flow of the coolant to be adjusted to suit the most varied tools. The used coolant flows back into the tank through the chip pan and through a strainer. The coolant entering into the bore of the spindle also flows back to the tank. Our supply of cooling equipment comprises a rear shield and a chuck guard which prevent splashing of the coolant around the machine. The electrical equipment is designed in accordance with standard specifications for machine tools. The terminal board is located in the switch box behind the front leg and accessible when the cover is removed. The power is supplied to the machine through a main switch which, when opened de-energizes the whole internal electrical equipment. The motors are controlled by push buttons which energize or de-energize air break contactors with thermal overload protection. The main and pump motors are protected against short circuits by fuses. The control circuit is protected by a separate fuse. An ammeter is provided to give a continuous check of the load of the machine. The machine is lighted by an electric lamp provided with joints by means of which it can be adjusted to give the most convenient lighting of the working space. The whole electrical equipment is normally designed and tested in our works for 380 Volts A. C., three phase, four wire, 50 cycles. If required by the customer the machine will be supplied with electrical equipment designed for a different system of electric power. The customer merely has to connect the machine to the mains.

OPERATION OF THE MACHINE. All the controls of the machine are conveniently arranged and their number is reduced to a minimum. The operation of the machine by preselection of speeds and feeds is unique in its simplicity. This also results in considerable savings in time during setting up, and reduction of idle times. The smooth finish of the sliding surfaces of all the moving parts contributes to an easy movement, accuracy and ease of operation. A detailed instruction book with illustrations, a wiring diagram, description, etc. is supplied with each machine. When completed every machine is subject to a test for manufacturing and working accuracy (according to the methods of Professor Dr. G. Schlesinger). The results of these tests are entered in a test chart which is supplied with the machine.

STANDARD EQUIPMENT (supplied without special order and included in the price of the machine):

1 transparent case and 20 operation charts,

18 indicators with figures), set of spanners (2 box spanners, 2 C-spanners, 3 double-ended spanners, 1 universal joint spanner),

1 screw driver,

1 grease gun,

1 handle,

1 square turret head,

Stops for carriage and cross slide,

1 rear shield against splashing coolant,

1 operator's instruction booklet.

SPECIAL EQUIPMENT: 220 Volt electric equipment (including lighting) without motors.

7.5 kW (11.5 HP) squirrel cage electric motor.

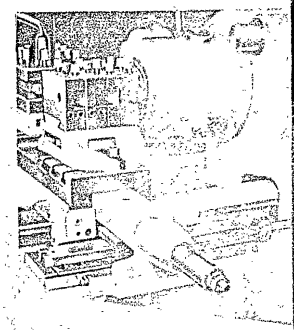
CRN 3 electric motor driven coolant pump with 0.125 kW (0.17 HP) electric motor, 2800 r. p. m.

Coolant piping with fittings, without electric motor driven coolant pump.

RP 101 Taper turning and copying attachment with follower roller mounted on RP 102 pin and RP 103 copying tracer.

The RP 101 taper turning and copying attachment is designed for working according to a ruler, i. e. for turning tapers up to 300 mm (12") long with angles up to 20°, or according to a template, i. e. for turning shapes also up to 300 mm (12") long and up to 35 mm (1 3/8") deep. Accordingly either the roller is used mounted on the RP 102 pin or the RP 103 copying tracer. The attachment is engaged and disengaged by means of a lever

RP 111 Screwcutting attachment. Both metric and Whitworth threads can be cut on the type R 5 capstan lathe. The method of operation is fundamentally the same as, but simpler than on a conventional lathe the lead screw and nut of which are replaced by an exchangeable leader and follower. The leader is clamped to the feed shaft and the follower is attached to a fitting at the left hand side of the saddle apron. The follower is brought into or out of engagement with the leader by means of a lever arranged at the left hand side of the saddle apron. The follower cannot be engaged when the power feed is engaged and vice versa. The screwcutting attachment enables threads to be cut close up to a shoulder by using the automatic disengaging mechanism. The pitch of the thread is given by the leader and follower. With one leader and follower threads with only one pitch can be cut.



RP 112 Screwcutting-leaders, RP 113 screwcutting followers. 2 sets of screwcutting leaders and followers are supplied for the cutting of the most common metric and Whitworth threads. Leaders and followers are normally manufactured for cutting threads with the following pitches:

1 1.25 1.5 1.75 2 2.5 3 3.5 4 4.5 5 5.5 6 and 7 mm

and Whitworth threads with 19-18-16-14-12-11-10-9-8-7-6-5-4½ and 4 threads per inch.

RP 112 leaders and RP 113 followers are marked with the pitch of the thread they are made to cut. Leaders and followers for cutting left hand threads are supplied to special order. When ordering please specify the quantity, whether for right hand or left hand, metric or Whitworth thread and the pitch or number of threads per inch. Examples of order specifications:

1 RP 112.113.10 R stands for 1 leader and 1 follower for cutting right hand metric threads with a pitch of 10 mm.

2 RP 112.10 WL stands for 2 leaders for cutting left hand Whitworth threads with 10 threads per inch.

1 RP 113.4.5 R stands for 1 follower for cutting right hand metric threads with a pitch of 4.5 mm.

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THE SADDLE. The bridge type saddle resting on the wide bed is capable of carrying heavy loads without undesirable distortions, which enables the capacity of the machine and cutting tool to be fully utilized. In cases when only the turret head is used for machining, the saddle may be moved away under the spindle.

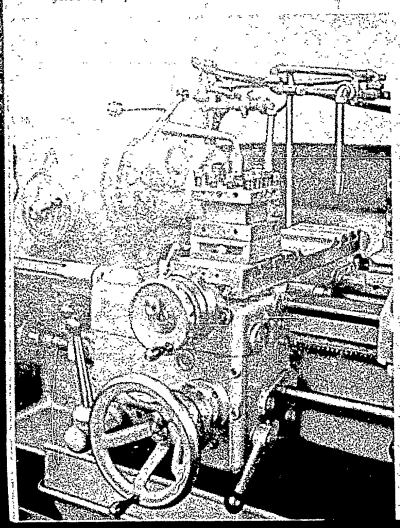
THE SADDLE SLIDE has bearing surfaces accurately scraped to fit the ground guideways of the bed on which it can be locked by means of a lever. The saddle slide carries the guideway for the cross slide.

THE CROSS SLIDE can be moved rapidly by hand, the rate of travel being 10 mm (3/8") per revolution of the hand wheel. Apart from the hand travel it is provided with 12 power feeds which can be disengaged by stops in either direction. A large dial with easily readable figures arranged near the cross slide crank permits precision turning to a given diameter. Any undesirable play of the nut of the cross slide screw can easily be taken up by means of a well accessible worm gear. The power feeds of the cross slide are identical with the longitudinal power feeds. Easily movable numbered indicators may be used to advantage for moving the slide by hand in the course of quantity production. The longitudinal and power feeds can be limited by a system of 6 longitudinal and 4 transverse stops. The position of the stops is easily adjustable on shafts with a square thread and they are provided with contact pieces which fold back, which makes the stops universal in their application. The automatic disengagement by means of positive stops operates both in the longitudinal and transverse direction with an accuracy of 0.02 mm (0.0008").

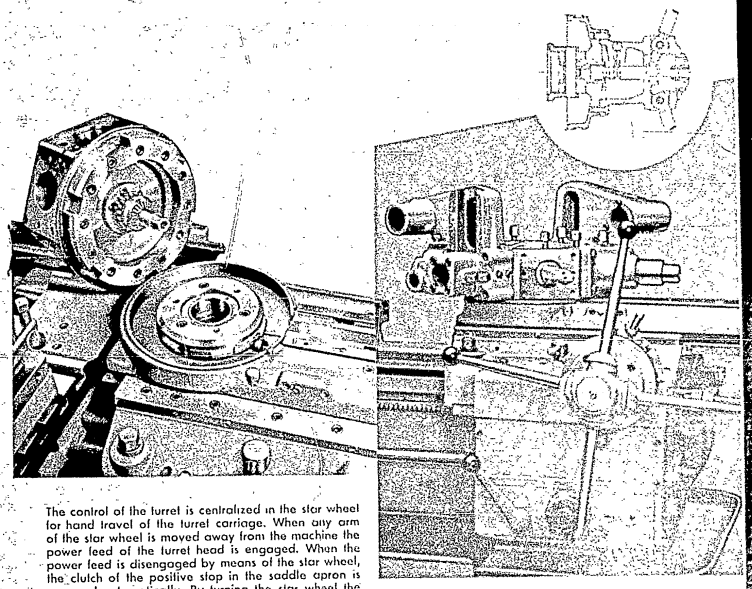
THE FOUR-WAY TOOL BLOCK and rear tool holder with heavy bolts permits even big tools with special shapes to be clamped firmly.

THE TURRET CARRIAGE APRON is of a design similar to that of the saddle apron and has also 12 power feeds ranging from 0.045 to 2 mm (0.002" to 0.08") per revolution of spindle and the feeds can be preselected by means of a star wheel and engaged independently of the feeds of the saddle apron even while the machine is running.

THE TURRET CARRIAGE is of rigid design reinforced with ribs. The bed of the turret head can be secured to the machine bed by two clamps. It may be moved along the machine bed by means of a hand wheel together with the saddle slide to which it can be coupled by means of a draw-rod. The turret slide can be secured to the guideways by a screw.



THE HEXAGON TURRET HEAD is centered on an adjustable double-row roller bearing. The turret head is locked and stiffened automatically at the beginning of the forward stroke of the slide. The unlocking, releasing and indexing of the turret head occurs, also automatically, at the end of the return stroke. The locking of the turret head by a strong hardened and ground bolt engaging with an indexing disc of very large diameter ensures a high and permanent accuracy. The movement of the turret carriage is limited by positive stops against which it is moved by means of a hand wheel and star wheel (by using an indicator) with an accuracy of ± 0.02 mm or by the power feed with an accuracy of 0.1 mm (0.0039"). A special universal joint spanner is supplied for quick setting of the stop screws. The safety clutches of the longitudinal and cross feeds in the saddle and turret carriage aprons permit the following forces to be developed in the feeds: longitudinally 1200 to 1500 kg (2640 to 3300 lbs), transversely 800 to 1100 kg (1760 to 2420 lbs). The clutch of the positive stop of the saddle is engaged by moving the feed control lever to its middle position, the clutch of the positive stop of the turret carriage by pressing the arms of the star wheel toward the machine. The automatic rotation of the turret head can be disengaged. When working against positive stops accurate work can be produced by the turret head. The stop screws are easy to adjust. When the securing screw is loosened they can be quickly moved to the approximate desired position. Accurate adjustment is obtained by hand or by means of a crosshandle wrench. The stops rotate simultaneously with the turret.



The control of the turret is centralized in the star wheel for hand travel of the turret carriage. When any arm of the star wheel is moved away from the machine the power feed of the turret head is engaged. When the power feed is disengaged by means of the star wheel, the clutch of the positive stop in the saddle apron is engaged automatically. By turning the star wheel the turret head is withdrawn from or advanced toward the work. The turret head may be equipped for bar or chuck work as required by the customer. Play in the guideways of the turret slides can be taken up by means of tapered gibs and screws.

THE LUBRICATION of the Type R 5 Capstan Lathe is designed to require a minimum of attention and checking. The gears and bearings of the headstock, gear box, saddle apron and turret carriage apron have independent oil pumps so that it is only necessary to fill the appropriate oil tanks, keep them filled to the level indicated by the oil level gauge and watch the operation of the pumps in the oil flow indicators. The gear box and headstock are lubricated by a gear pump which delivers the oil into a distributing cup on the headstock from which all moving parts of the transmission mechanism are lubricated by a spray. The oil is delivered through a lamination type filter which stops even the most minute particles of dirt. The saddle apron and turret carriage apron have their own separate piston pumps which distribute the oil to the slides, the guideways of the bed, the worm gear and to the bearings and drives in the gear boxes. The lubrication of the turret head is automatic. All other points are lubricated by a few single or group lubricators for the filling of which a grease gun is supplied with the machine.

COOLING. The cooling system on which depends, in a large measure, the quality of the machined surface and the life of the cutting edge of the tool fulfils all the requirements of a perfect distribution of the coolant. The coolant tank is self-contained and is located on the floor underneath the chip pan, from which it is separated so that it can be cleaned easily. The coolant pump is arranged on the tank. The coolant is distributed through two

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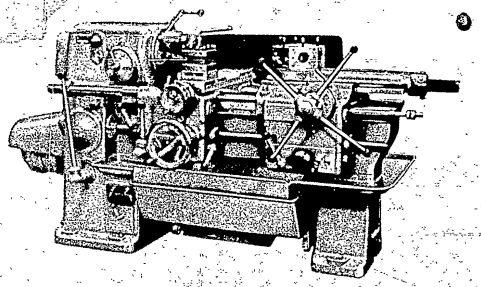
THE DRIVE. The 11.56 HP flange mounted driving motor is arranged on the outside of the left leg. The rotor of the electric motor is accurately dynamically balanced and its shaft is directly coupled with the shaft of the two-directional multi-plate clutch. The motor is protected by a cover.

THE GEAR BOX. The gear box drive is controlled by the two-directional multi-plate clutch and an efficient multi-plate brake. The high-speed gears of the gear box made of alloy steel are hardened and ground, the tooth flanks of the sliding gears are rounded off. In the course of the manufacturing process the gears are subjected to several inspections carried out by means of the most modern measuring instruments. All the gear box shafts are running in anti-friction bearings.

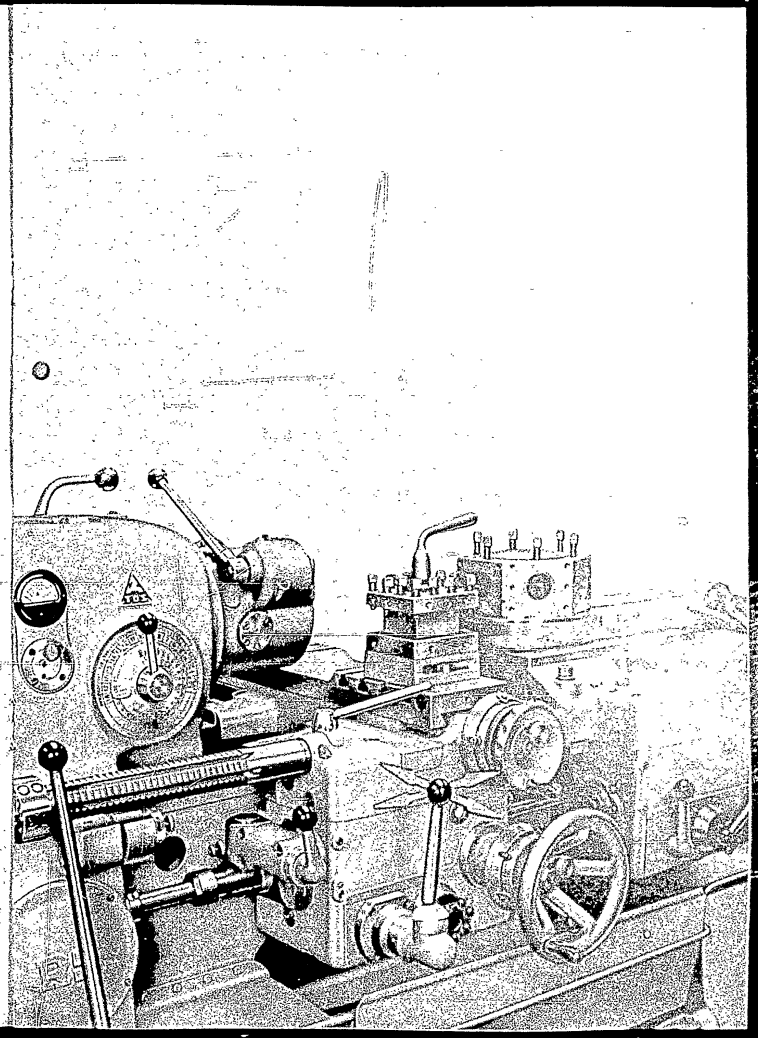


THE BED forms, together with the left and right legs, a single rigid structural unit having a wide cross section. The side walls are stiffened by diagonal U-shaped ribs so that the bed forms a rigid beam and a sturdy base for the machine, resisting all distorting influences and forces. The strong side walls prevent sagging, the reinforcing ribs twisting. The wide guideways are precision ground and their hardness of more than 200° Brinell carefully checked. The front and rear guideways between the headstock and the saddle are protected by covers against abrasion and corrosion by chips and coolant respectively. The guideway covers between the saddle and the turret slide are attached to the saddle and pass through openings cast in the turret slide bed. This ensures an enduring accuracy of the guideways. Fine dust and chips are removed from the guideways by steel wipers.

FEEDS. The feed drive is taken off the spindle through gears and is arranged in the front part of the gear box. The saddle apron is of simple design and the mechanism is readily accessible for inspection when the front cover is removed. The front side of the saddle apron carries the hand wheel for longitudinal feed, the preselection disc and the joystick type lever for engaging the feeds. The hand wheel is provided with a large dial for easy reading of feeds.

ENGAGEMENT OF FEEDS. The longitudinal and cross power feeds are engaged by a single joystick type lever. Its movement in four directions corresponds to the direction of the feed engaged. During any operation the rate of feed can be preselected and on completion of the operation the preselected feed engaged by depressing the lever at the right hand side of the saddle apron. Not only the preselection but also the engagement of the feed may be done while the machining is running. The following twelve rates of longitudinal feed are available:

0.045-0.06-0.09-0.125-0.18-0.25-0.35-0.50-0.71-1-1.4-2 mm per revolution of spindle.



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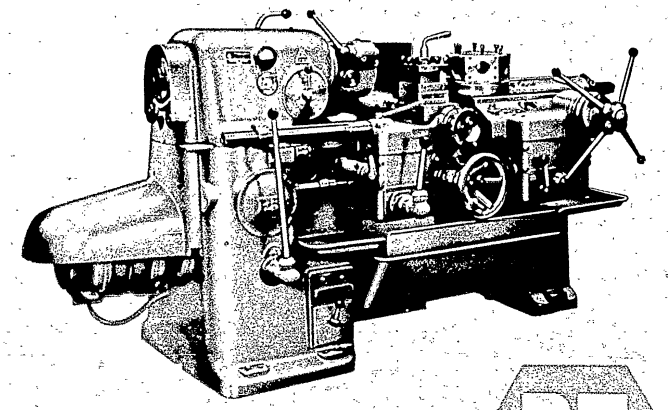
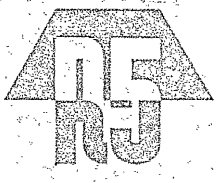


THE TOS CAPSTAN LATHE, TYPE



is a universal machine which meets all the requirements of an up-to-date machine tool designed to fully utilize high power cutting tools. Its design was based on the results of the most recent machining research, on experiences of designers and technicians engaged in production and on constant co-operation with the customers. If provided with the appropriate equipment it can be used to advantage both for bar and chuck work.

OUTSTANDING FEATURES: A large number and wide range of speeds and feeds arranged in fine steps enables tools made of high speed steels and cutting alloys to be economically used for cutting the widest variety of materials.

Preselection of speeds and feeds considerably simplifies operation and cuts down idle, unproductive times.

Sequence of movements of joystick type control lever for engaging the longitudinal and cross slide feed.

Automatic disengaging of feeds of the slides as well as of the turret head by positive stops.

Square tool post with automatic movement when control lever is released.

Exceptionally easy maintenance and cleaning of turret head.

Turret head controlled by star wheel for hand feed.

Simple, convenient and rapid operation cuts down production times. Number of controls reduced to minimum.

DESCRIPTION

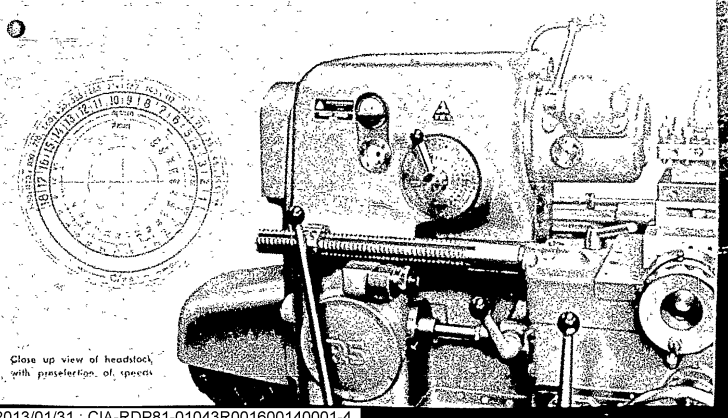
THE HEADSTOCK is a separate, totally enclosed rigid box. In order to obtain a constant low temperature of the headstock and thereby to ensure a permanent working accuracy of the machine the gear box is located in the left leg of the machine and completely separate from the headstock proper. This arrangement places the spindle as far as possible from sources of harmful vibrations and heat, the centre of gravity of the machine is low, so that the operation of the machine is quiet and noiseless even at the highest spindle speeds.

THE SPINDLE has a very heavy cross section and is made of alloy steel, cemented, hardened and accurately ground. It is very rigid and its critical speeds are above the maximum operating speeds. Its front end runs in an adjustable double-row roller bearing, its rear end in two specially accurate radial bearings which take up the thrust. The play which appears in the spindle bearing after a long period of operation can easily be eliminated. At its front end the spindle is provided with a flange and a taper for fitting a self-centering or a quick action collet chuck.

PRESELECTION OF SPINDLE SPEEDS. The high capacity of the machine and the use of cemented carbide tipped tools has reduced machining times. In order to reduce unproductive times the problem of changing spindle speeds was solved by preselection. The speed for the next operation may be preselected while cutting by simply turning the preselection knob on the headstock. The speed indicator has altogether 4 scales. The fixed dial carries the scale of spindle speeds in r. p. m., the scale of spindle speed numbers and the scale of cutting speeds in metres per minute. The rotary dial carries the scale of machined diameters in millimetres. For a given selected speed and machined diameter the cutting speed in metres per minute can be read at a glance on the appropriate scale. On request the indicator may be supplied with diameters in inches and cutting speeds in feet per minute. The preselection can also be used inversely, when the machined diameter and the cutting speed are known. These two figures are set on the scales opposite each other which preselects the corresponding spindle speed. The spindle speed change proper is done by means of the lever arranged on the gear box. This lever also controls the two-directional multi-plate clutch and brake. The preselected spindle speed is changed by moving the lever out of its neutral position away from the machine. The following 18 speeds are available:

28-35.5-45-56-71-90-112-140-180-224-280-355-450-560-710-900-1120-1400 r. p. m.

OPERATION CHARTS. The desired speeds are only selected by the scales when the machine is being set up. During operation it is easier to remember only the speed and feed numbers and not to burden one's memory with the figures. For repetition work or for a larger batch of machined parts it is recommended to use tables known as operation charts. These tables are supplied with the machine together with a transparent case. They have to be filled in when the machine is first set up and filed for possible future use when the job is completed. The tables are filled in according to symbols by inserting speed and feed numbers. The operator only reads or memorizes simple numbers instead of involved r. p. m. and feed figures with several digits.



Close up view of headstock with preselection of speeds

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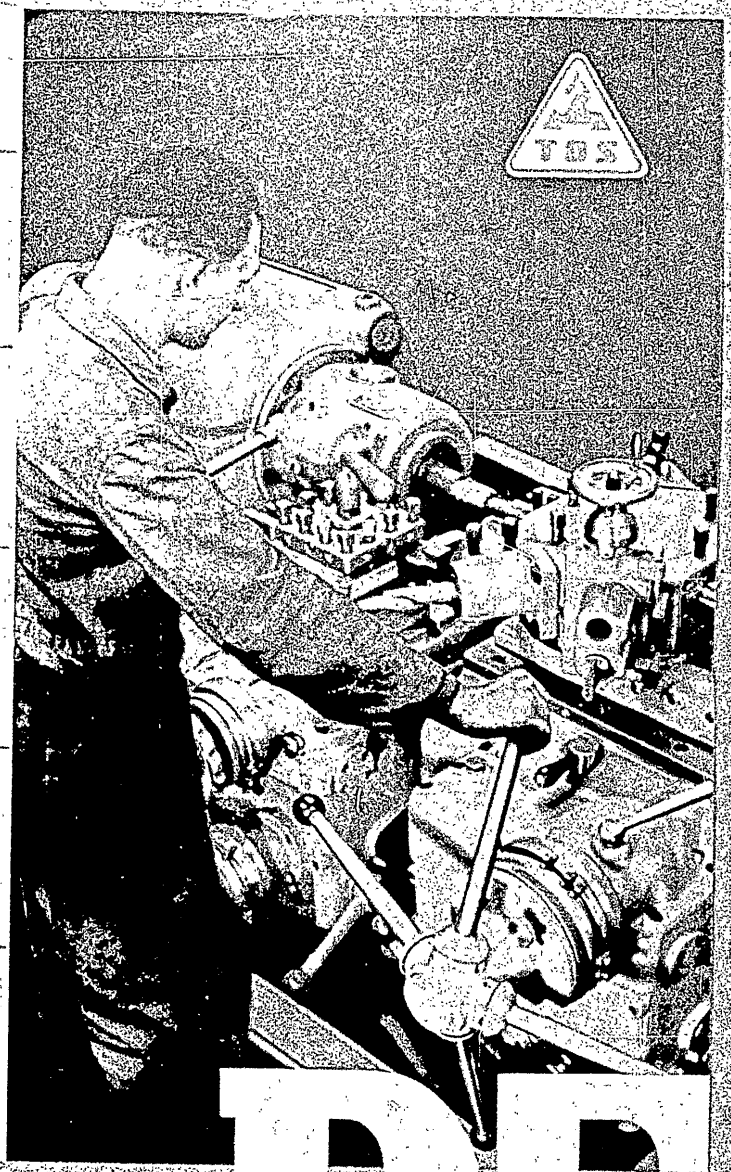

TOS CAPSTAN LATHE

Type **R5**

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Specification

Bar capacity	mm	7	[illegible]"
Maximum turning length by means of flat cam	mm	60	2⅜₆₄"
Maximum spindle speed	r. p. m.	10,000	
Minimum spindle speed	r. p. m.	1,420	
Number of spindle speeds		20	
Number of speeds of camshaft		48	
Maximum diameter of thread cut:			
in soft steel		M 4	
in brass		M 6	
Input of machine	H. P.	2	
Overall dimensions of machine			
(without bar feed)	mm	1,400×650×1,430	4'8"×2'2"×4'9"
Maximum length including bar feed, approx.	mm	4,600	15'2"
Weight of machine, approx.	kg	650	1430 lbs

Alterations in detail of design of machine reserved
Please state operating voltage in your order.

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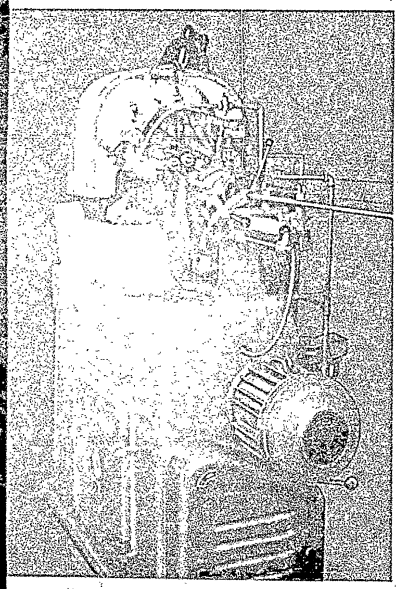
Type AD6 Single Spindle Automatic Lathes AD6

The machine serves for the automatic machining of long parts of a maximum diameter of 7 mm (17/64") and a maximum length of 60 mm (2 23/64").

GENERAL ARRANGEMENT OF MACHINE

6 tool slides are arranged radially, the headstock is moved lengthwise by the action of flat cams (for particularly long parts by bell shaped cams) controlled by a single camshaft, the workpiece is guided in a fixed bush (alternatively in rotating bush).



The machine is suitable for the manufacture of fairly long parts of small diameters. The bar slides during machining out of the guide bush so that the cutting tools are close to the end of the spindle which prevents distortions of the workpieces and improves the quality of machining.

The spindle is driven by an electric motor by means of V-belts. 20 spindle speeds can be obtained by changing the belt pulley. The headstock slides on the guideways of the bed. It is moved by a lever mechanism driven by a disc cam.

The tools are clamped in 6 sliding tool posts arranged radially around the axis of the spindle. The tools are moved by a lever mechanism controlled by cams. The exact position of the tools is set by sliding screws with indexing rings.

Threads are cut, and holes drilled by means of attachments. The attachments of the spindles rotate in the same direction as the headstock spindle. The cutting speed is given by the difference in speed of the spindle. All movements of the elements of the machine, including the feed of the bar stock, are completely automatic.

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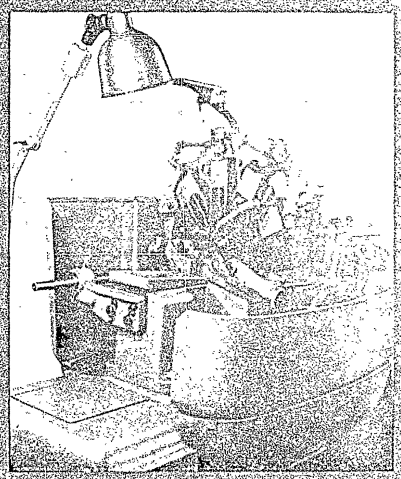
Optional Equipment

Va 1 — Three-spindle attachment	R 15 — Stock chucking collet, round
Vb 1 — Milling attachment	R 18 — Drill chucking collet
Vc 1 — Safety equipment	R 30 — Instrument for tracing cams
Vd 1 — Copying attachment	R 31 — Compasses for tracing cams
Ve 1 — Plunge-cut attachment	R 32 — Templates for tracing slope and ascent of curves
Vf 1 — Single-spindle attachment	R 35 — Cam shaping machine
R 1 — Fixed guide bush	R 53 — Micrometer and headers for measuring of cams
R 11 — Collet of rotating guide bush, round	
R 14 — Insertions of fixed guide bush	



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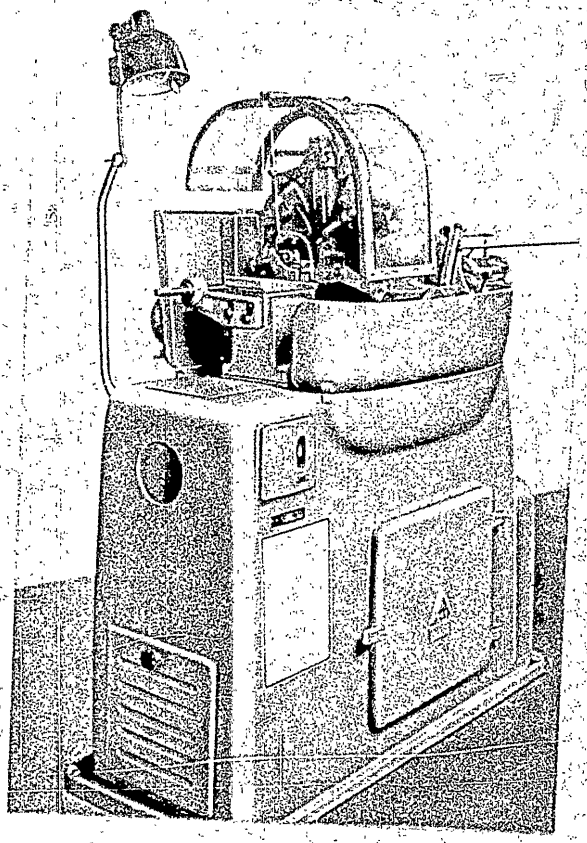

Type **AD6**

Single Spindle Automatic Lathes

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Optional Equipment

A Third slide.
— Noiseless stock support.
B Outside feed attachment for bar stock.
— Set of parts for hand insertion.
— Lighting.
E Motor drive for attachments F, H, L.
F High speed drilling attachment in turret head.
G Feeding equipment for attachments H, J, L.
H Slotting attachment.
J Cross drilling attachment.
L Nut tapping attachment.
KV Disc cam checking apparatus.
FV Disc cam cutting fixture.
Z Magazines.
— Chip pans.

SPECIFICATION

WORKING RANGE			
Bar capacity without outside feed	mm	40	1 9/16"
Bar capacity with outside feed	mm	46	1 13/16"
Maximum length of feed	mm	160	3 15/16"
Maximum diameter of thread cut in steel without use of screwcutting attachment	mm	28	1 3/32"
Maximum diameter of thread cut in brass without use of screwcutting attachment	mm	36	1 7/16"
Maximum diameter of thread cut by means of screwcutting attachment	mm	36	1 7/16"
Range of production time per piece:			
standard	seconds	2.9 to 300	
with change gears supplied to special order	seconds	5 to 700	
SPINDLE			
Number of turning speeds		8	
Range of turning speeds	r. p. m.	300 to 3000	
Number of screwcutting speeds		16	
Range of screwcutting speeds	r. p. m.	75 to 510	
Number of screwcutting speeds available for every turning speed		2	
TURRET HEAD			
Diameter of turret head	mm	160	6 29/32"
6 tool holes of turret head, dia. (on request inch size holes, dia.)	mm	25	1"
Maximum length of tool from turret centre	mm	100	3 31/64"
Maximum and minimum distance, turret head to nose of spindle, including adjustment and travel	mm	68 to 159	2 21/32" to 6 7/16"
Maximum movement of turret head	mm	65	2 9/16"
Maximum length of straight line movement when turret head is rotated in forward position (snap movement of tool out of cut)	mm	65	2 9/16"
CROSS SLIDES			
Maximum travel	mm	45	1 25/32"
DRIVE			
Standard flange mounted electric motor:			
output	KW	4.2	
speed	r. p. m.	1430	
Floor space	mm	1900 × 750	6'3" × 2'6"
Weight of machine	Kg	1540	3390 lbs

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS

The particulars given in the prospectus are not binding due to changes caused by development.

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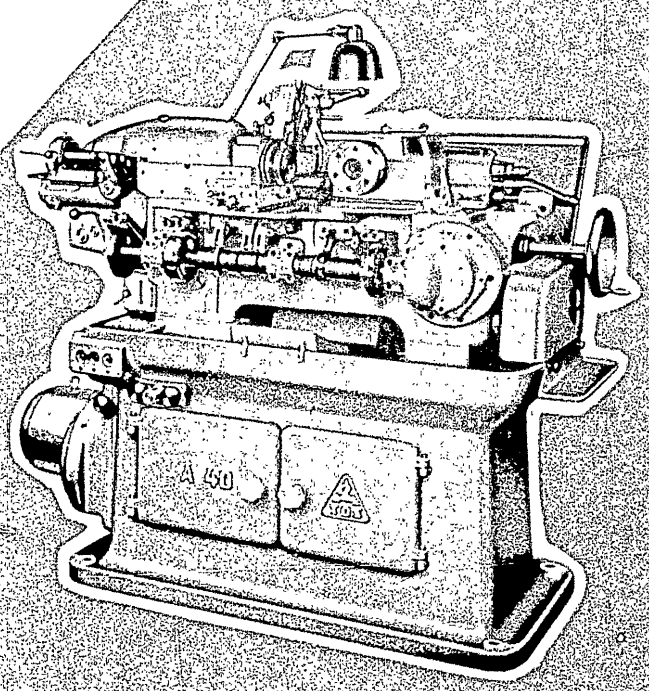

ŠKODA

TYPE A 40 AUTOMATIC MACHINE

The machine is intended for mass and multiple production of parts made of steel as well as of non-ferrous and light metals.

The headstock spindle is driven by a roller chain through the gear box in the stand of the machine.

The movements of the carriage are controlled by cams fitted to the camshaft. The turret slide is moved by means of a cam and gear segment.

Standard Equipment

Flange mounted electric motor with air break contactor.
Reversing equipment for cutting left-hand threads (built-in).
Disc cam for swing bar stop (built-in).
Equipment for indexing turret head two tool holes (built-in).
2 bar guiding posts with spare bar carriers.
1 set of change gears for spindle speeds.
1 set of change gears for worm gear box.
Table of speeds and change gears.
1 type Uak 40 chuck collet, 40 mm dia.
1 type Uah 40 feed collet, 40 mm dia.
1 type Uaf 40 guide bush, 36 mm dia.
1 disc cam blank for turret slide.
2 disc cam blanks for cross slides.
*) 1 drilling jig for turret slide disc.
*) 1 drilling jig for cross slide discs with appropriate insert also for third slide.
*) Sample of curves of ascent and descent.
1 tray for finished products.
2 guard plates and covers.
*) 1 set of spanners, oil can, grease gun, etc.
1 set of spare parts (chain links, 2 chuck fingers, 2 pushers, steps, shear pins, springs etc.).
*) 1 instruction book for operation and adjustment of automatics.
*) 1 catalogue of chucking equipment and spare parts catalogues.

*) Note. 1 piece for 1 order, unless ordered otherwise

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SPECIFICATION

		SU 250	SUA 300	SU 350	SUA 400
WORKING RANGE:					
Height of centers above bed	mm	250	300	350	400
Maximum turning length	mm	0 to 1000	0 to 1000	0 to 1500	0 to 1500
Maximum swing: up to 300 mm (11 3/8") from spindle	mm	470	650	520	800
over bed	mm	530	630	730	860
over standard carriage	mm	300	300	410	360
over double carriage	mm	225	290	310	420
Maximum cross section of tool	mm	40 x 40	40 x 40	40 x 40	40 x 40
Diameter of face plate	mm	540	620	720	820
Chucking range, diameter (3)	mm	50 to 455	50 to 565	75 to 665	75 to 765
	mm	275	275	360	360
3- or 4-jaw chuck, dia. as required by customer	mm	320	320	410	410
	mm	360	360	460	460
Steady rests: small design, diameter	mm	20 to 200	20 to 200	25 to 250	25 to 250
large design, diameter	mm	190 to 200	190 to 360	250 to 470	250 to 570
Follow rest, diameter	mm	20 to 200	20 to 360	20 to 200	20 to 200
MAIN SPINDLE:					
Diameter in front bearing	mm	120	120	140	140
Bore	mm	40	40	60	60
Taper		Metric 70	Metric 70	Metric 70	Metric 70
Taper of reducing sleeve		No. 6 Morse	No. 5 Morse	No. 6 Morse	No. 6 Morse
Speeds: number		32	32	32	32
range	either r. p. m.	9.8 to 1250	8.5 to 1100	7.1 to 930	6.4 to 830
	or r. p. m.	—	—	5.7 to 740	5 to 650
Speed in reverse		1.25 x speeds forward			
STANDARD FEEDS:					
Number of longitudinal and cross feeds		88			
Range of longitudinal feeds	mm per. rev.	0.01 to 2.5			
Cross feeds		0.45 x longitudinal feeds			
FINE PRECISION FEED:					
with use of lead screw and equipment supplied to special order:					
Number of fine feeds		44			
Range	mm per. rev.	0.011 to 0.1635			
THREADS:					
Metric: number		110			
pitch	mm	0.2 to 120			
Whitworth: number		99			
threads per inch		1/4 to 120			
Module: number		88			
pitch for module	mm	0.125 to 30			
Diametral Pitch: number		77			
threads per 1" dia.		1.78 to 64			
Circular Pitch: number		99			
pitch		1/128 to 3.54			
LEAD SCREW:					
Diameter	mm	50		65	
Pitch	mm	12		12	
TAILSTOCK:					
Diameter of tailstock sleeve	mm	120			
Live center or, on special request, dead center: taper		No. 5 Morse			
angle of point		60°			
movement of tailstock sleeve	mm	200		250	
TURNING OF TAPERS:					
Maximum length of taper	mm	700			
Maximum angle (to either direction)		10°			
COPYING FROM TEMPLATE:					
Maximum length of template	mm	700			
Maximum depth	mm	100			
Diameter of roller	mm	70			
ELECTRIC MOTOR:					
Power	kW	9/16			
Speed	r. p. m.	700/1380			
Floor space required by machine at minimum turning length	mm	3200x1360	3200x1360	3700x1550	3700x1550
Weight of machine at minimum turning length with standard equipment but without electric motor and electrical equipment	kg	3500	3600	4700	4800
Increase in weight per every additional 500 mm (19 1/2") turning length	kg	240	240	260	260
Weight of 1 supporting leg	kg	70	70	70	70

PLEASE SPECIFY IN YOUR ORDER THE MAINS VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS

The machines are continuously being improved upon. The particulars given in this prospectus are, therefore not binding in detail.

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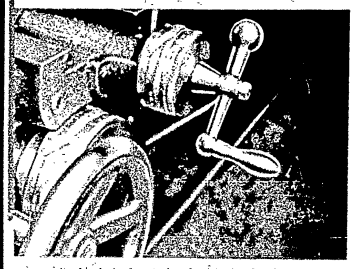
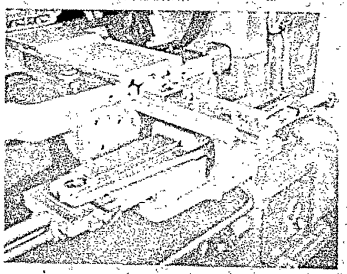
OPTIONAL EQUIPMENT

The following equipment is available to special order and against extra charge:

REAL TOOL POST fitted to a common slide easily removable.



Double Indexing Scales, Longitudinal and Transverse.



Taper Turning Attachment.

SMALL STEADY REST with three jaws with rollers running in anti friction bearings.

LARGE STEADY REST of identical design but for larger diameters.

FOLLOW REST with three jaws, two of which fitted rollers running in anti friction bearings, the bottom jaw with a sliding bearing surface.

DOUBLE INDEXING SCALE OF LONGITUDINAL TRAVEL fitted on the apron box and indicating the travel through which the carriage has passed in tenths of millimetres.

DOUBLE INDEXING SCALE OF CROSS TRAVEL of similar design as longitudinal scale and indicating the travel through which the cross slide has passed in 0.05 mm.

THREAD INDICATOR permitting the start of the thread to be identified for taking another cut.

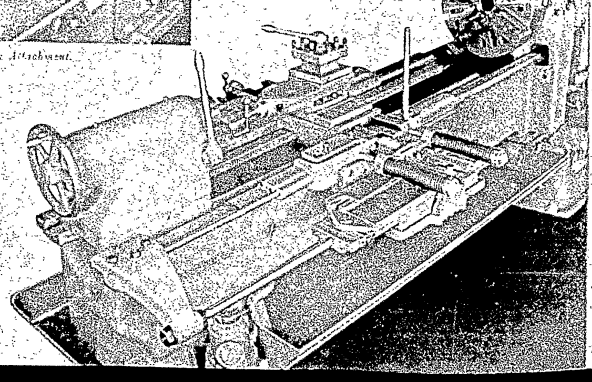
TAPER TURNING ATTACHMENT, easy to fit to the rear of the carriage, intended for the turning of tapers up to 700 mm (2'3 ½") long and up to an angle of 10° in either direction.

COPYING ATTACHMENT. Serves for external as well internal copying of various shapes from a template up to a length of 700 mm (2'3 ½") and a depth of 100 mm (3 5/16"). The majority of parts is common for the copying and taper turning attachments. It is therefore recommended to order both attachments together. The change-over from the copying attachment to the taper turning attachment is very simple.

CHAMFERING ARM permits chamfering while turning is in progress.

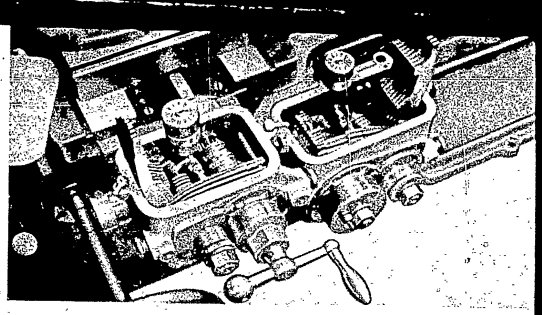
MAGNETIC FILTER for lubricating oil. Separates even the minutest ferro-magnetic particles from the oil as it flows through channels past a powerful magnetic core.

UNIT LIGHTING.



LONGITUDINAL FEED DISENGAGING BOX AND CROSS FEED DISENGAGING BOX.

The longitudinal and cross feeds can be limited by automatic disengaging boxes with an accuracy of 0.01 mm (0.0004") which eliminate the difficulties encountered in keeping the longitudinal measures within specified tolerances. The disengaging boxes are controlled by the disengaging mechanism of the apron box. They disengage without shock because the positive stops operate at low pressures. They permit any of the 12 longitudinal or cross feed stops to be set quickly so that their use considerably increases the output of the lathe and it is economical to set them even if only a single piece is to be machined.



Longitudinal and Cross Feed Disengaging Boxes.

The boxes are independent units and can easily be fitted to new as well as to previously supplied ŠKODA lathes of the types SUR 260, SUR 300, SUR 350 and SUR 400 with serial numbers from OB 10,742 upward.

PNEUMATIC CHUCK.

Intended for quick overhung chucking of the workpiece. It consist of a chucking cylinder, a pneumatic control valve and a three jaw chuck. This equipment, together with the feed disengaging boxes permits the lathe to compete in performance, for certain kinds of work, with the heavier turret lathe being, at the same time, more accurate, more rigid and having, in fact, a larger output if cemented carbide tipped tools are used. The chuck is provided with two sets of jaws for external and one set of jaws for internal chucking.

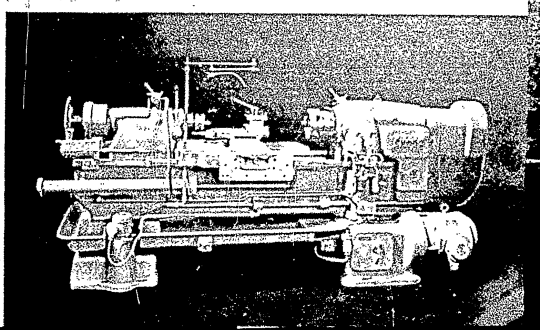
Outside Diameter of Chuck D	M	Outside Chucking Diameter N	O	P	Inside Chucking Diameter R	
	10 to 60 mm		70 to 170 mm	80 to 180 mm		
	13/32" to 2 23/64"		2 49/64" to 6 11/16"	3 5/32" to 7 5/64"		
250 mm	50 to 100 mm		160 to 220 mm	180 to 200 mm		[illegible]
9 27/32"	1 31/32" to 3 59/64"		6 5/16" to 8 31/32"	7 3/32" to 10 15/64"		[illegible]
315 mm	20 to 125 mm	120 to 225 mm	220 to 325 mm	80 to 180 mm	180 to 200 mm	[illegible]
12 13/16"	51/64" to 4 29/32"	4 47/64" to 8 27/32"	8 43/64" to 12 25/32"	3 5/32" to 7 5/64"	7 3/32" to 11 15/16"	[illegible]
		140 to 160 mm				
400 mm	20 to 140 mm	200 to 300 mm	280 to 410 mm	85 to 200 mm	300 to 128 mm	[illegible]
		5 33/64" to 6 19/64"				
15 3/4"	51/64" to 5 1/2"	7 7/8" to 12 1/32"	11 1/64" to 16 5/32"	3 29/64" to 8 3/16"	8 43/64" to 12 57/64"	[illegible]

PNEUMATIC RAPID RETURN OF CARRIAGE

Considerably facilitates operation and reduces idle times.

PNEUMATIC MOVEMENT OF TAILSTOCK SLEEVE.

Makes setting up of workpiece considerably easier.



General Rear View of Machine Equipped with Pneumatic Movement of Tailstock Sleeve, Rapid Return of Carriage and Pneumatic Chuck.

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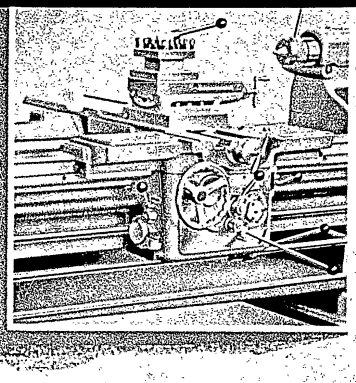


Carriage with Rear Tool Post Supplied as Optional Equipment.

CARRIAGE.

The carriage is, exceptionally rigid. The long guideways of the longitudinal slide reduce the specific pressure on the sliding surfaces. Their wear is therefore very small. The sliding surfaces are, in addition, covered by steel guards on both sides of the carriage.

LEAD SCREW.

The lead screw is guided underneath the front guideway of the bed so that it is protected from falling chips.

APRON BOX.

The apron box is equipped with automatic disengagement of the longitudinal and transverse feed by a positive stop. The machine is protected against overload by a safety coupling which disengages the feed automatically when the pressure of the tool or the pressure caused by some obstruction exceeds a certain limit. The coupling of the automatic disengagement of the feed is provided with a large number of dogs so that its engagement is practically instantaneous.

LUBRICATION.

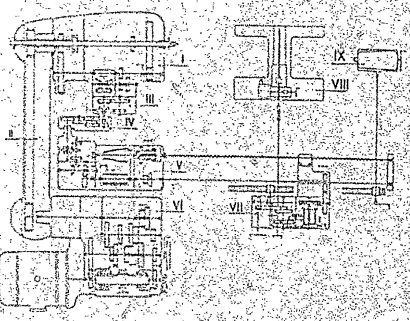
The entire machine is centrally lubricated by a gear pump fitted in the gear box. The pump supplies oil to all the parts of the machine. It is started when the main motor is started.

Only the apron box is lubricated independently by its own automatic oil pump. The number of lubricating points which have to be lubricated by hand is exceptionally small.

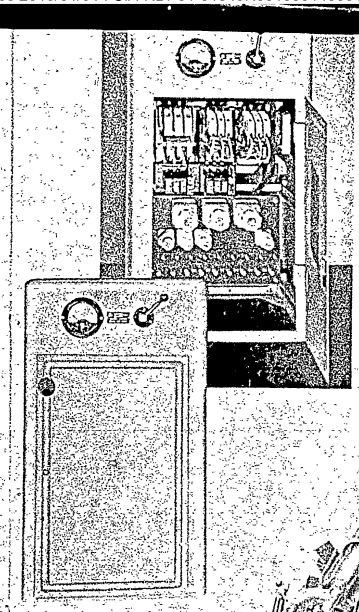
COOLING.

The cooling equipment consists of an electric motor driven pump fitted at the rear of the machine which supplies coolant through a telescopic tube to the point of work.

Diagram of the Drive of the Machine.



I. Headstock.
II. Chain Drive.
III. Feed Box.
IV. Change Gear Box.
V. Quick Change Gear Box.
VI. Gear Box.
VII. Apron Box.
VIII. Carriage.
IX. Tailstock.



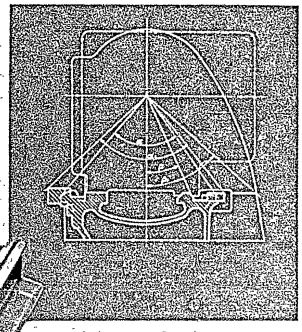
Electric Switchgear Cabinet.

ELECTRICAL EQUIPMENT.

The modern electrical equipment which includes contactors and protective equipment is built into a special cabinet separate from the machine. The load of the machine may be observed on an ammeter.

BED.

The bed, which is particularly rigid is provided with massive guideways for the carriage. It does not vibrate even at the heaviest load of the machine. The large elliptic holes between the stiffening ribs afford an easy passage for the chips. The guiding surfaces are wide, ground and scraped. The sketch shows that the method of taking up the load from the bed is more favourable than in the case of lathes of other makes.



STANDARD EQUIPMENT

This machine is supplied with the following equipment, a list of which is included in the price:

Complete electrical equipment including flange-mounted motor, two-speed electric motor, electric motor for coolant pump, electric switchgear cabinet, main master control switch and electric wiring.

Face plate.
Live center for tailstock.
Change gears.
Cooling equipment.
Four-way tool post.
Crank with gear for movement of tailstock.
1 driver plate.
1 dead center.
1 reducing sleeve from Nr. 5 Morse for main spindle.
1 mandrel for fitting of face plate.
2 stops for limiting longitudinal travel of carriage.
1 set of spanners for attendance of machine.
Tables for speeds, rates of feed, threads and attendance of machine.
Supports of lead screw and feed shaft (supplied for turning lengths from 3 meters 48" 10" upwards).
Operating instructions of machine.

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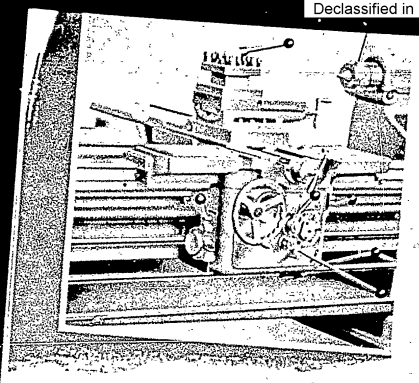


Carriage with Rear Tool Post Supplied as Optional Equipment

CARRIAGE.

The carriage is exceptionally rigid. The long guideways of the longitudinal slide reduce the specific pressure on the sliding surfaces. Their wear is therefore very small. The sliding surfaces are, in addition covered by steel guards on both sides of the carriage.

LEAD SCREW.

The lead screw is guided underneath the front guideway of the bed so that it is protected from falling chips.

APRON BOX.

The apron box is equipped with automatic disengagement of the longitudinal and transverse [illegible] by a positive stop. The machine is protected against overload by a safety coupling which disengages the feed automatically when the pressure of the tool or the pressure caused by [illegible] exceeds a certain limit. The coupling of the automatic disengagement of the feed is provided with a large number of dogs so that its engagement is practically instantaneous.

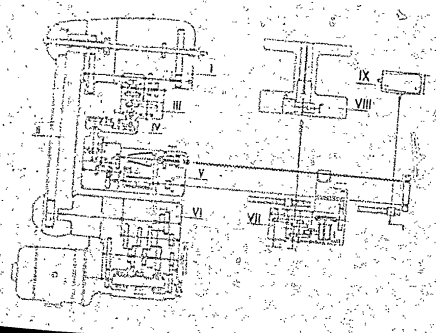
LUBRICATION

The entire machine is centrally lubricated by a gear pump fitted in the gear box. The pump supplies oil to all the parts of the machine. It is started when the main motor is started. Only the [illegible] lubricated independently by its own automatic oil pump. The number of lubricating points which have to be lubricated by hand is exceptionally small.

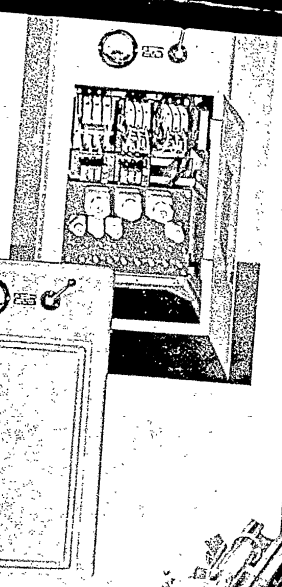
COOLING.

The [illegible] of an electric motor driven pump fitted at the rear of the machine which supplies [illegible] tube to the point of work.

Dimensions for Power of the Machine



I. Headstock.
II. Chain Drive.
III. Feed Box.
IV. Change Gear Box.
V. Quick Change Gear Box
VI. Gear Box.
VII. Apron Box.
VIII. Carriage.
IX. Tailstock.



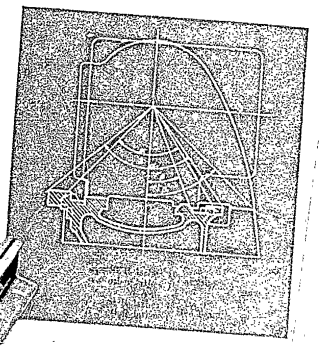
Electric Switchgear Cabinet.

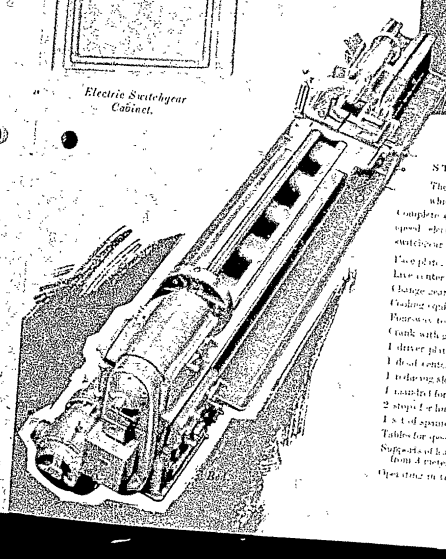
ELECTRICAL EQUIPMENT.

The modern electrical equipment which includes [illegible] and protective equipment is built into a special cabinet separate from the machine. The load of the machine may be observed [illegible] ammeter.

BED.

The bed, which is particularly rigid, is provided with [illegible] guideways for the carriage. It does not vibrate even at the heaviest load of the machine. The large [illegible] between the stiffening ribs afford an easy passage for the chips. The [illegible] surfaces are wide, ground and scraped. The sketch shows that the method of taking up the load from the [illegible] than in the case of [illegible] of other [illegible].





STANDARD EQUIPMENT

The machine is supplied with [illegible] which is included in the [illegible]

Complete electrical equipment including [illegible] speed electric motor [illegible] switchgear cabinet [illegible]

Face plate.
Live center for tailstock.
Change gears.
Cooling equipment
Four-way tool post
Crank with gear for movement of tailstock
1 driver plate
1 dead center
1 reducing sleeve (metric 70 No. 5 Morse for [illegible])
1 mandrel for fitting of face plate
2 stops for limiting longitudinal travel of carriage
1 set of spanners for [illegible] of machine
Tables for speeds, rates of feed, thrusts and attendance of machine
Supports of lead screw and feed shaft supplied for turning [illegible] from 3 meters (9' 10" upward)
Operating instructions of machine

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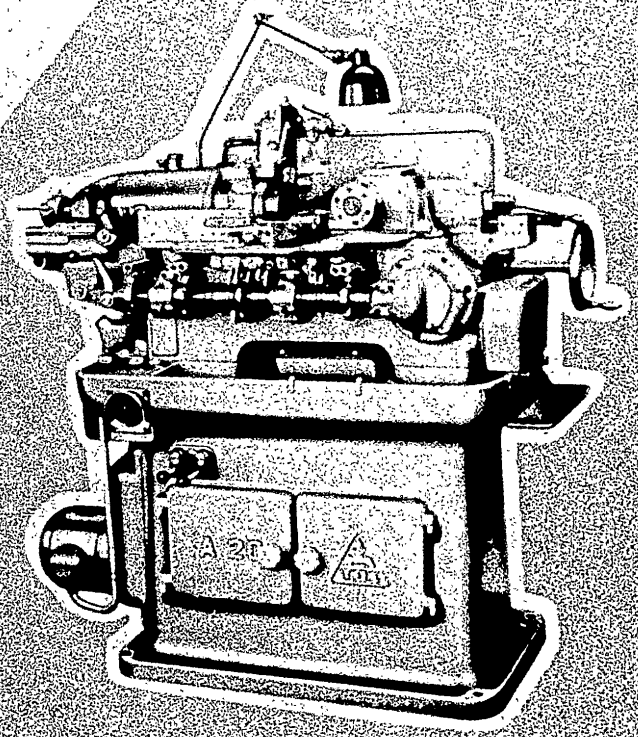
STROJEXPORT

A20



ŠKODA

REVOLVERAUTOMAT MODELL A 20

Die Maschine ist für die Massen- und Serienerzeugung von Teilen aus Stahl, Buntmetallen und Leichtmetallen bestimmt.
Die Arbeitsspindel wird mittels Rollenkette vom Getriebekasten im Maschinenständer angetrieben.
Die Bewegung der Seitenschlitten wird durch auf der Steuerwelle angeordnete Kurvenscheibe und Hebel betätigt. Der Vorschub des Revolverschlittens erfolgt mit Hilfe einer Kurvenscheibe und eines Zahnsegmentes.

Normalzubehör:

Flatschmotor mit Luft-Schutzschalter
Reversierschaltung für das Schneiden von Linksgewinden (eingebaut)
Kurvenscheibe für schwingenden Werkstoffanschlag (eingebaut)
Zweilochschaltung (eingebaut)
2 Ständer für die Materialführung mit Auflagen für Vorratsstangen
1 Satz Wechselräder für den Wechsel der Spindeldrehzahlen
1 Satz Wechselräder für Schneckengetriebe
Drehzahl- und Wechselrädertabelle
1 Spannfange Ueg 20 × 30
1 Vorschubfange Ueh 20 × 30
1 Führungsbüchse Ueg 20 × 30
1 vorgedrehte Kurvenscheibe für den Revolverschlitten
1 vorgedrehte Kurvenscheiben für die Seitenschlitten
1 Bohrlehre für die Revolverkopf-Kurvenscheibe
1 Bohrlehre für die Seitenschlitten mit entsprechender Einlage für den dritten Seitenschlitten
Kurvenmuster für Aufstieg und Abstieg
1 Schale für fertige Werkstücke
1 Schutzblechs und Schilder
2 Satz Schlüssel, Ölkanne, Handschmierpresse u. s. w.
1 Satz Reservetöle (Kettenglieder, 2 Spannhebel, 3 Druckhülsen, Schaltknaggen, Scherstifte, Federn u. s. w.)
1 Anleitung für den Betrieb und die Einstellung der Automaten
1 Katalog der Spannwerkzeuge und ein Katalog der Ersatzteile

Bemerkung: 1 Stück zur Bestellung, falls nicht anders bestellt.

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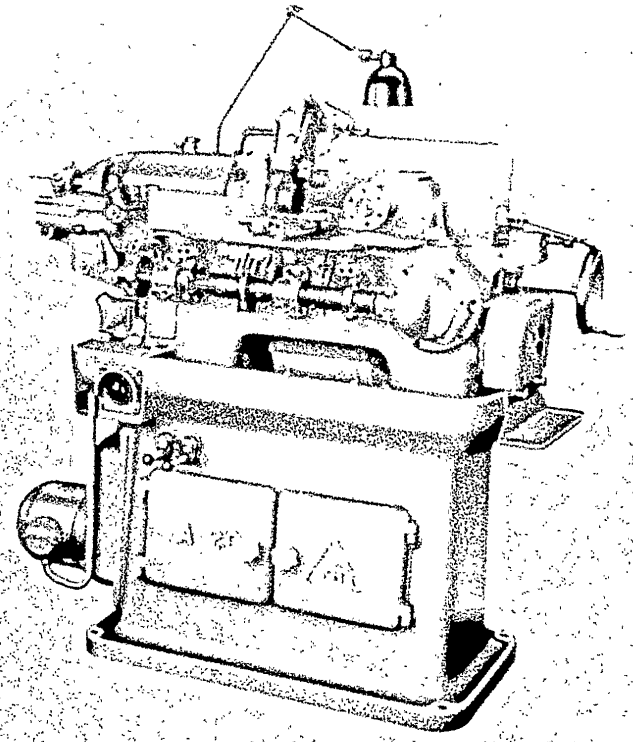

ŠKODA

REVOLVERAUTOMAT MODELL A 20

Die Maschine ist für die Massen- und Serienerzeugung von Teilen aus Stahl, Buntmetallen und Leichtmetallen bestimmt.

Die Arbeitsspindel wird mittels Rollenkette von Getriebekasten im Maschinenständer angetrieben.

Die Bewegung der Futterschlitten wird durch auf der Steuerwelle angeordnete Kurvenscheiben und Hebel übertragen. Der Vorschub des Revolverschlittens erfolgt mit Hilfe einer Kurvenscheibe und eines Zahn[illegible]

Normalzubehör

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Sonderzubehör

[illegible]

TECHNISCHE ANGABEN:

ARBEITSBEREICH:
Werkstückdurchlass ohne Schutzgehäuse [illegible]
Werkstückdurchlass bei Aussenschutz [illegible]
Grösste Werkstückdurchmesser [illegible]
Grösster Gewindedurchmesser in Stahl ohne Verwendung der Gewindeschneideinrichtung ... mm [illegible]
Grösster Gewindedurchmesser in Messing ohne Verwendung der Gewindeschneideinrichtung ... mm [illegible]
Grösster Gewindedurchmesser mit Gewindeschneideinrichtung ... mm [illegible]
Arbeitsweise: normal ... mm [illegible]

ARBEITSSPINDEL:
Anzahl der Drehzahlstufen beim Drehen [illegible]
Drehzahlbereich beim Drehen ... U/min [illegible]
Anzahl der Drehzahlstufen beim Gewindeschneiden [illegible]
Drehzahlbereich beim Gewindeschneiden ... U/min [illegible]
Für jede Drehzahlstufe beträgt die Anzahl der Stufen für das Gewindeschneiden: normal [illegible]
auf Sonderbestellung [illegible]
insgesamt [illegible]

Bei Verwendung eines zweistufigen Motors wird die doppelte Anzahl der Drehzahlstufen für das Drehen und Gewindeschneiden erzielt. Auch die Anzahl der Verhältnisse des Drehens zum Gewindeschneiden wird vergrössert.

REVOLVERKOPF:
Durchmesser des Revolverkopfes ... mm [illegible]
6 Werkzeuglöcher im Revolverkopf ... Ø mm [illegible]
(auf Wunsch in engl. Zoll) [illegible]
Grösste Werkzeuglänge von Mitte Revolverkopf ... mm [illegible]
Grösste und kleinste Entfernung von Spindel zu Revolverkopf einschliesslich Regulierung und Hub ... mm [illegible]
Grösster Weg des Revolverkopfes ... mm [illegible]
Grösste Länge des geraden Weges beim Schalten des Revolverkopfes in der vorderen Lage (Herausnehmen des Werkzeugs aus dem Schnitt) ... mm [illegible]

SEITENSCHLITTEN:
Grösster Weg ... mm [illegible]

ANTRIEB:
Normaler Flanschmotor: Leistung ... kW [illegible]
Drehzahl ... U/min [illegible]
Zweistufiger Flanschmotor auf Sonderbestellung: Leistung ... kW [illegible]
Drehzahl ... U/min [illegible]
Flächenbedarf der Maschine ... cm [illegible]
Gewicht der Maschine ... kg [illegible]

[illegible] ... FÜR DIE ELEKTROMOTOREN ANZUGEBEN.

[illegible]

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PRAHA TSCHECHOSLOWAKEI

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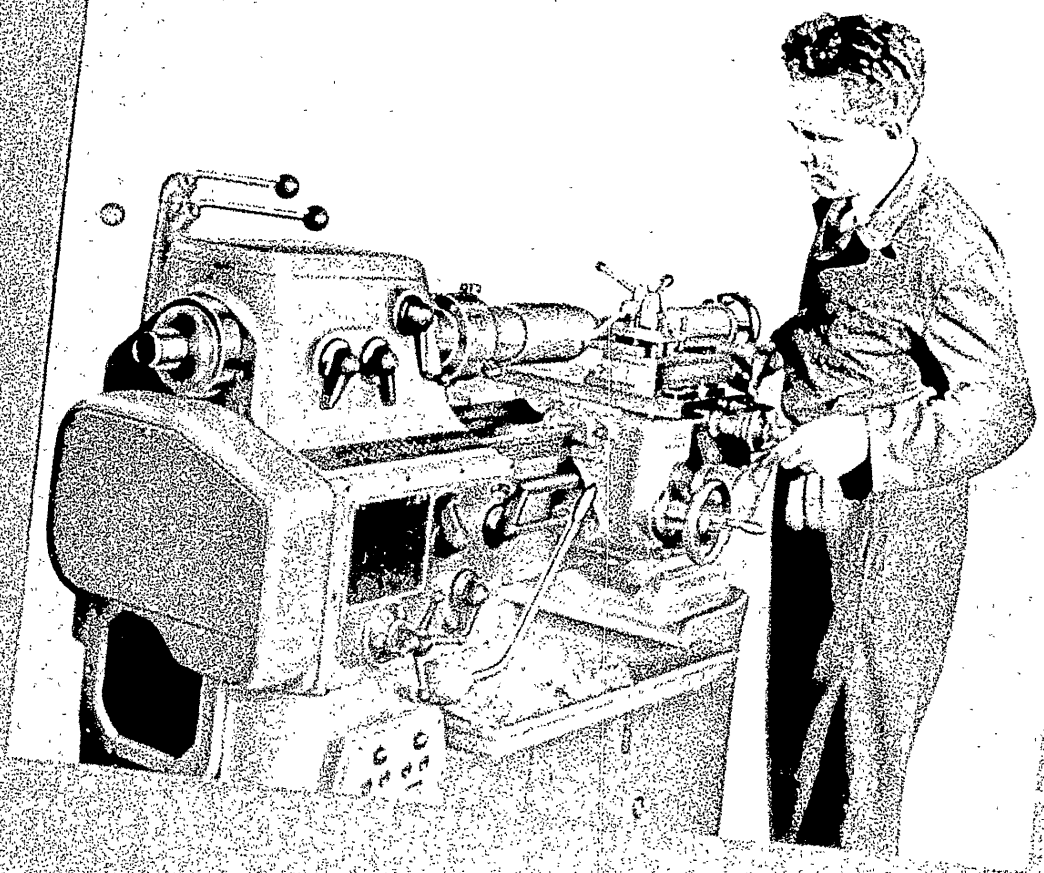
TOS

CENTRE LATHE



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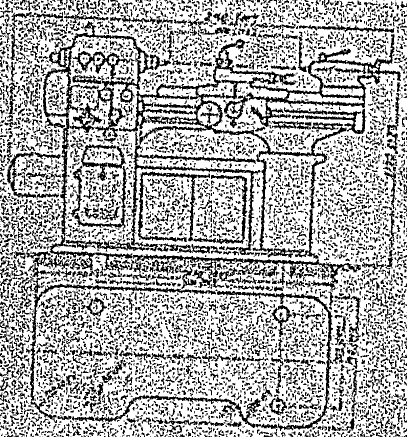
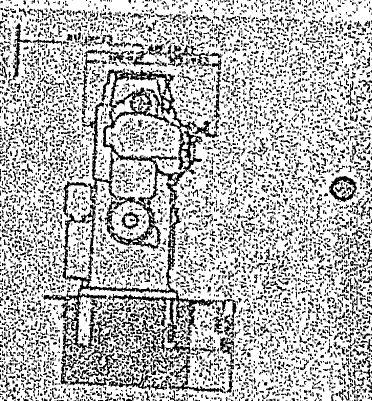
TECHNICAL DATA

Swing over bed	mm 280		11"
Distance between centres	mm 750		29 1/2"
Swing over carriage	mm 150		5 1/8"
Width of bed	mm 250		9 1/8"
Diameter of face plate	mm 250		9 1/8"
Bore through spindle	mm 36		1 3/8"
Taper in spindle		metric No 40	
Taper in lathe centres		Morse No 3	
Spindle nose according to DIN 800		M 68×6	
Spindle speeds: 3 speed bands, 18 speeds each:	r.p.m.	20 to 1000	
on special order	r.p.m.	31.5 to 1600	
	r.p.m.	63 to 3150	
Feed: 36 longitudinal feeds, ranging from	mm/rev.	0.03 to 3.52	9-750 t.p.i.
36 cross feeds, ranging from	mm/rev.	0.01 to 1.22	21 to 2540 t.p.i.
Pitch of lead screw	mm	6	
Threads: 36 metric threads, pitch	mm	0.375 to 44	
36 module threads, module	mm	0.375 to 44	
36 Witworth threads	t.p.i.	3.4 to 88	
Speed of motor	r.p.m.	2800	
Output of motor	HP	4	
Floor space required (width×length)	mm	910×2140	33"×85"
Weight of machine: with standard equipment	kg	1080	2400 lbs
with packing	kg	1250	2760 lbs
with seaworthy packing	kg	1450	3200 lbs
Contents boxed	cu.m	4	142 cu. ft





WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

The particulars in this prospectus are not binding in detail.

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PRAHA CZECHOSLOVAKIA

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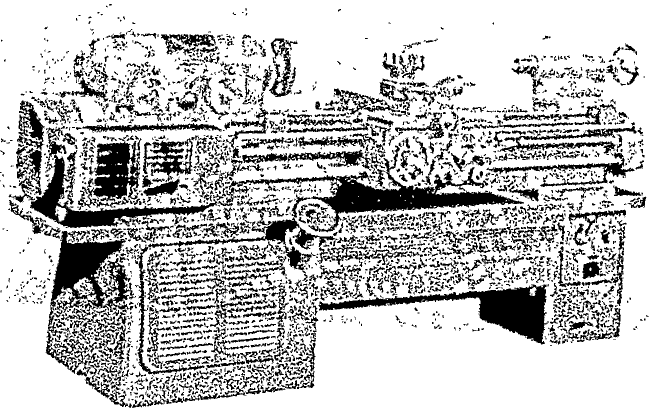
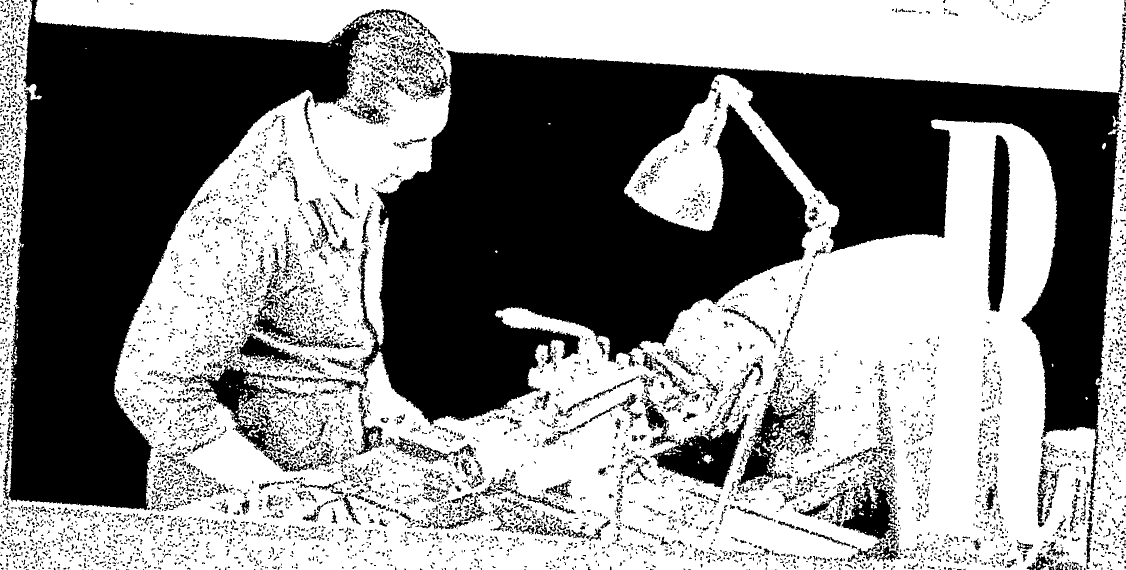


SV

UNIVERSAL

Lathe



R

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UNIVERSAL LATHE

Model

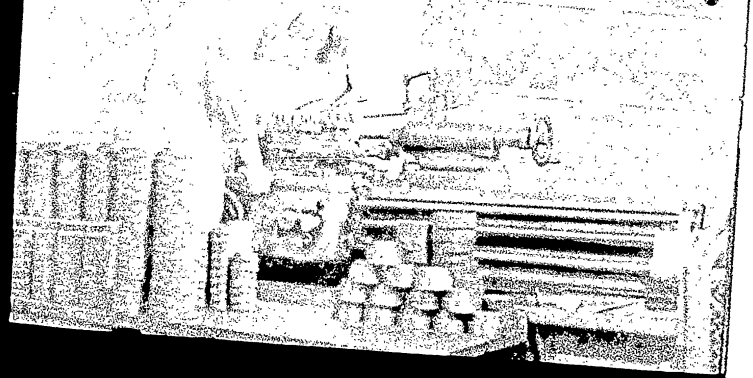
SV 18R

Heavy duty production machine adapted to all current turning operations. It may be used both for one-off parts and multiple production and enables economical machining of all kinds of materials.

Characteristic features:

- Wide spindle speed range
- Wide range of power feeds
- Smooth and quiet running even at maximum spindle speeds
- Excellent precision
- High output

The machine may be employed to advantage especially for jobs where high accuracy and high quality of the surface finish of the machined parts are of prime importance.



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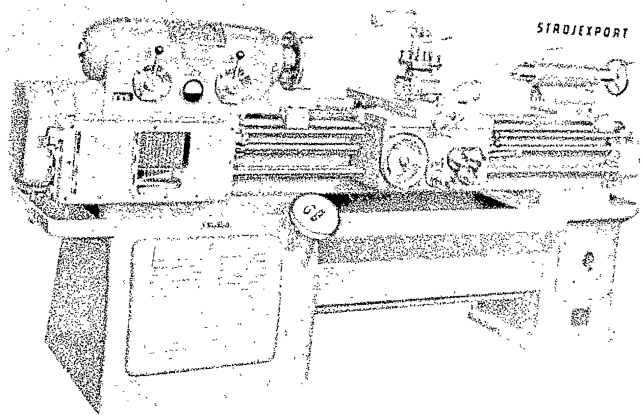
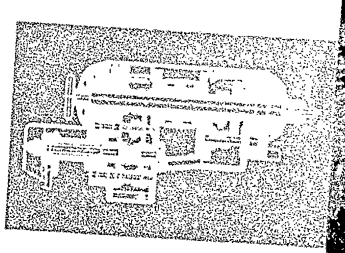
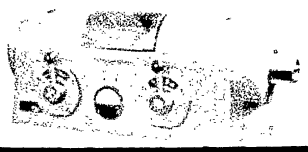


DESCRIPTION

The spindle

The spindle speed range





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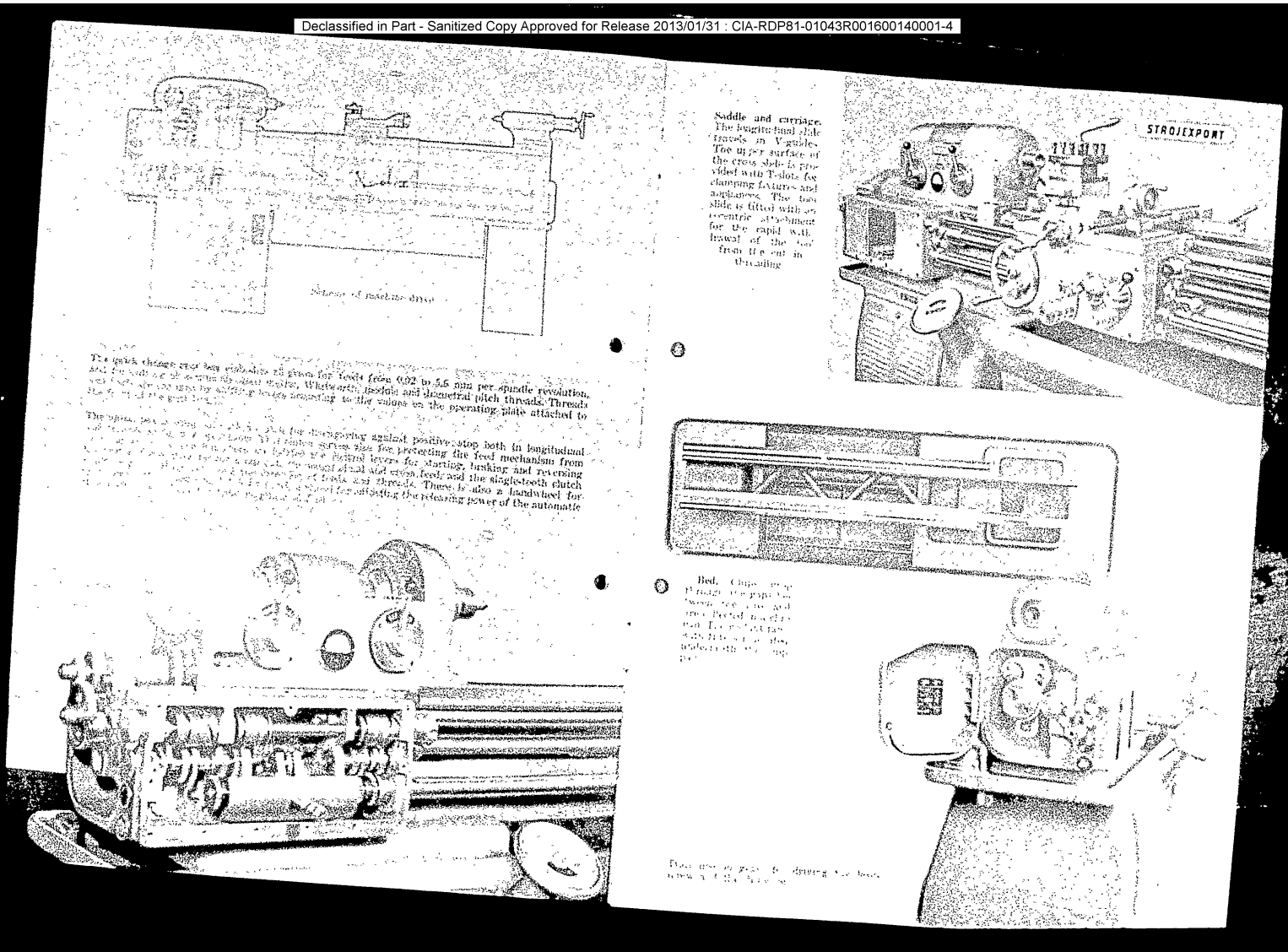

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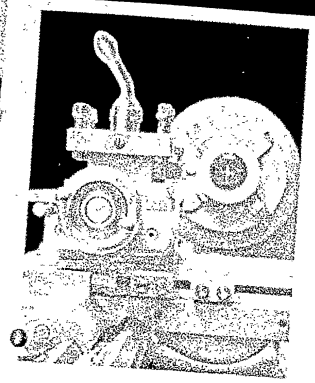
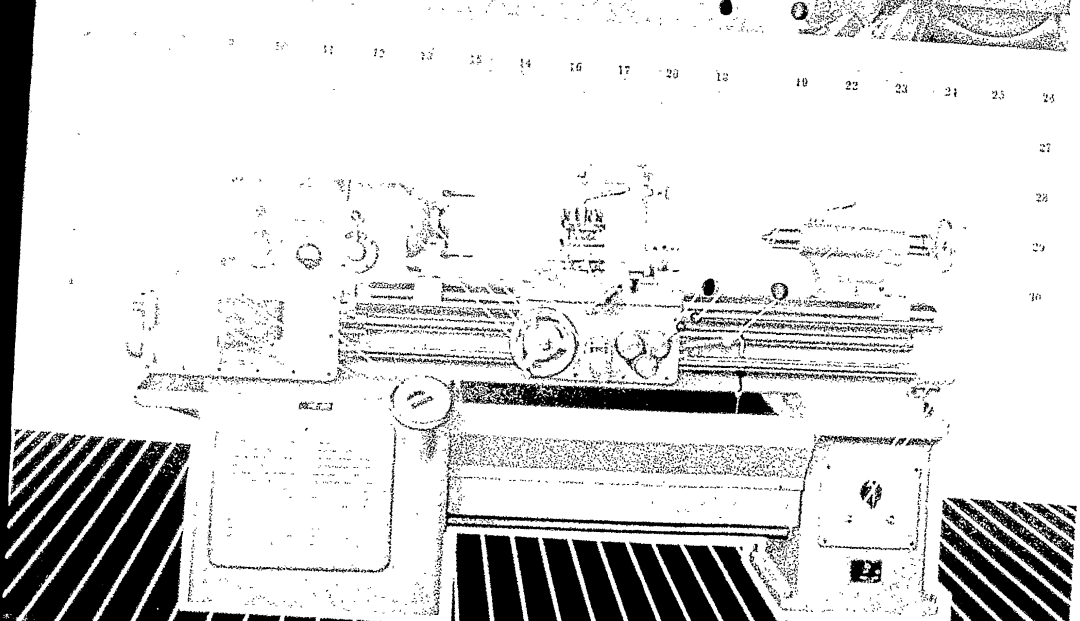
LAYOUT OF CONTROLS





1. Handwheel for spindle speed change.
2. Spindle speed scale.
3. Lever of quick-change gearbox.
4. Handwheel of [illegible] gearbox for [illegible] of 1:1, 1:2, 1:4, 1:8.
5. Handwheel for changing [illegible] and [illegible]
6. Headstock lever for [illegible] and [illegible] threads.
7. Stops of longitudinal [illegible]
8. Headstock lever for direct [illegible] gears of 1:8.
9. Handwheel for longitudinal [illegible]
10. Screw of indexing [illegible]
11. Handle for [illegible] feed of slide.
12. Handle for [illegible] by hand
13. Handle for [illegible]
14. Ring with dial.
15. Lever of the [illegible] of the tool [illegible]
16. Control lever [illegible]
17. Handle for [illegible]
18. Ring with dial.
19. Hand [illegible]
20. Handwheel for [illegible]
22. Control lever [illegible]
23. Lever for [illegible] and feeds.
24. Locking [illegible]
25. Lever for [illegible] motor.
26. Screw for [illegible]
27. Handwheel for [illegible] sleeve.
28. Master switch [illegible]
29. Pilot bulb of the master switch.
30. Pilot bulb of the coolant [illegible]

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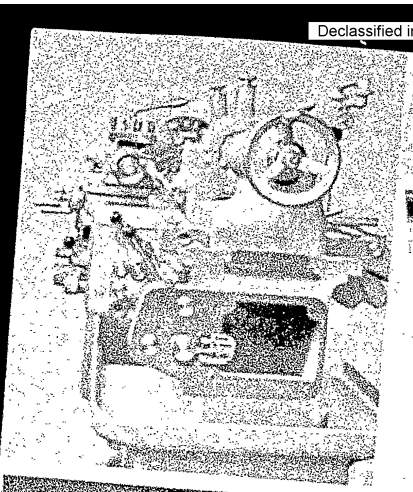
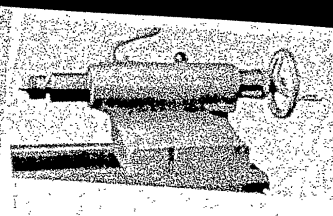
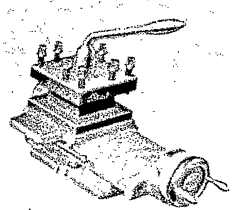




The tailstock is cross adjustable for taper turning. The tailstock centre sleeve is hardened and ground and fitted with a scale in millimetres as well as with an indexing ring for very fine adjustment. It may be secured in the required position by tightening a hand lever.

The cooling attachment consists of a centrifugal electric pump, suction and delivery piping and an oil pan with coolant tank. The inlet piping for the coolant is attached to the carriage so that the coolant flow follows the path of the tool.

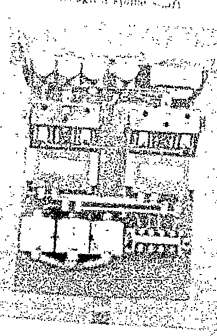
Steady and follow rests



1-way toolpost

Electrical equipment.

The machine is fitted with remote push-button control of the main drive motor. The current to the control circuit is supplied by means of a zero conductor if the voltage available is 380 volts, in case of another voltage the current is supplied from a special transformer. The switch for the main drive motor and coolant pump and the switch for the spot light and the signal bulb are mounted on the electric control panel at the front of the right hand cabinet leg. Inside the cabinet leg there are also the air-operated switch, transformer and fuses. Starting and reversing of the motor is accomplished by shifting the lever located on the right hand side of the apron box. This lever operates the switch through a spline shaft.



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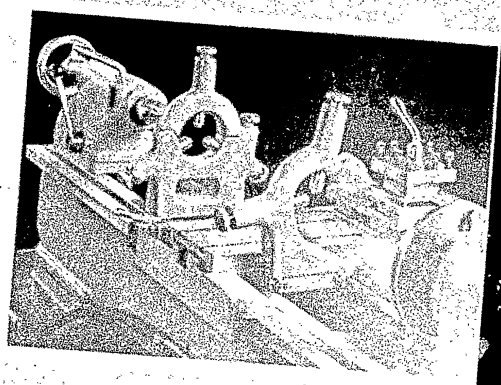

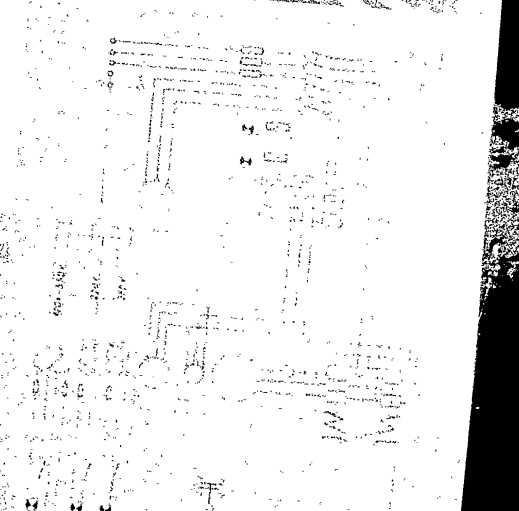

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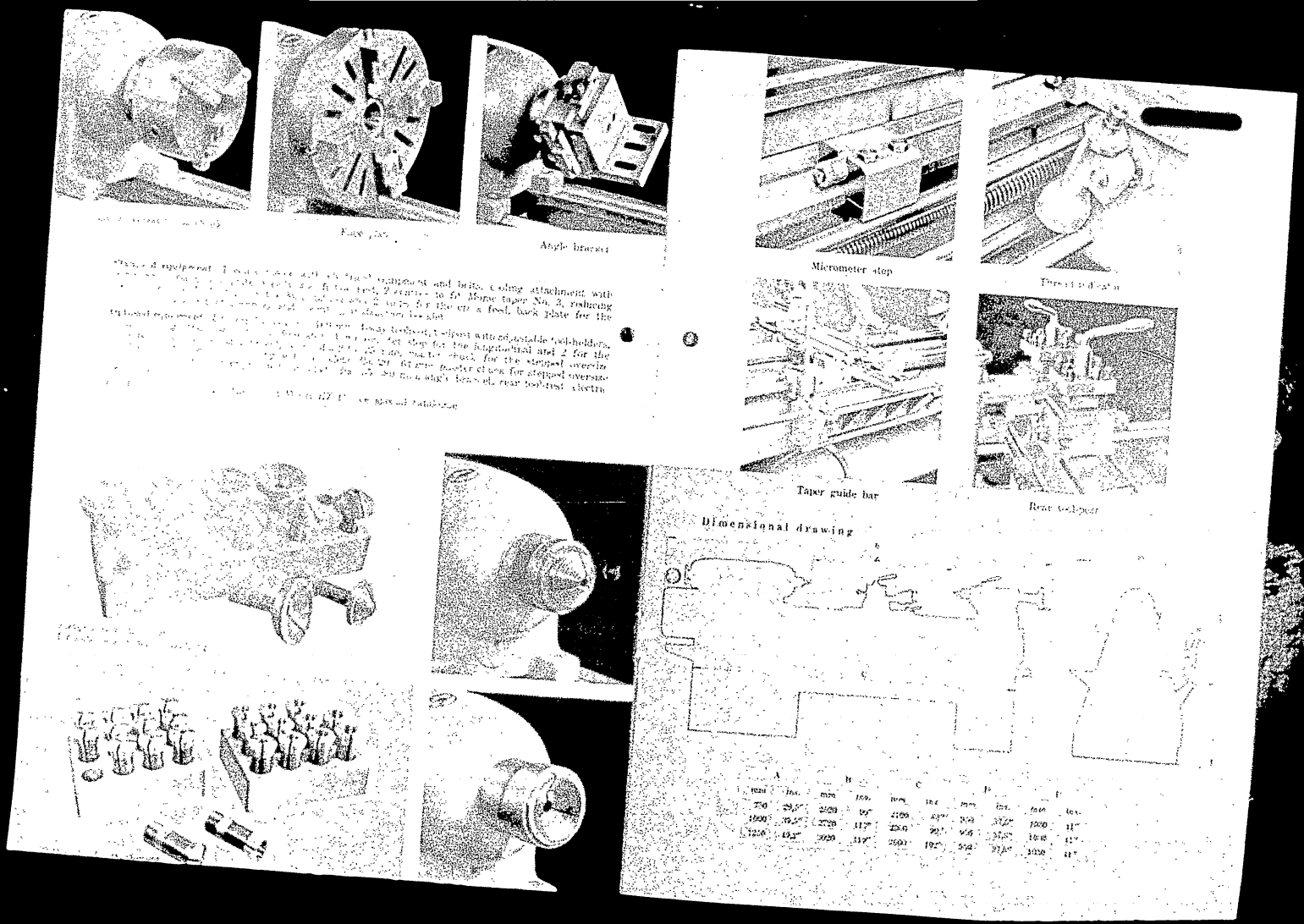

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SPECIFICATION:

[illegible]							
[illegible]							
[illegible]							
[illegible]							
Taper of spindle							
Taper of centres							
Spindle [illegible]							
Max. swing with [illegible]							
Max. swing with follow [illegible]							
Width of bed	mm						
Diameter of face plate	mm						
Diameter of catch plate	mm						
Diameter of jaw chuck	mm						
Section of 4 way tool [illegible] internal	mm						
external	mm						
Maximum section of tool	mm						
Stroke of tailstock centre sleeve	mm						
Maximum weight of workpiece	mm						
Spindle speeds 21 in number, ranging from	kg						
Range of longitudinal feeds	r. p. m.						
Range of cross feeds	mm/rev						
Pitch of lead screw	mm/rev						
Threads: Metric	r. p. i.						
Whitworth	mm						
Module	r. p. i.						
Diametral Pitch	module						
Speed of main drive motor	DP						
Speed of coolant pump motor	r. p. m.						
Output of main drive motor	r. p. m.						
Output of coolant pump motor	HP						
For distance between centres	HP						
Floor space required	mm	750	1000	1250			
Weight of machine: with standard equipment	mm	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
with domestic packing		2520	2720	3020	[illegible]	[illegible]	[illegible]
with seaworthy packing	kg	1710	1780	1910	[illegible]	[illegible]	[illegible]
Contents Joined	kg	1775	1820	1950	[illegible]	[illegible]	[illegible]
	kg	2110	2180	2250	[illegible]	[illegible]	[illegible]
	cu m	4.5	5	5.5	cu ft [illegible]	cu ft 175	cu ft 1[illegible]

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

AS IMPROVEMENTS IN DESIGN ARE CONTINUALLY BEING MADE, THIS SPECIFICATION IS NOT TO BE REGARDED AS BINDING IN DETAIL, AND DIMENSIONS ARE SUBJECT TO ALTERATION WITHOUT NOTICE.

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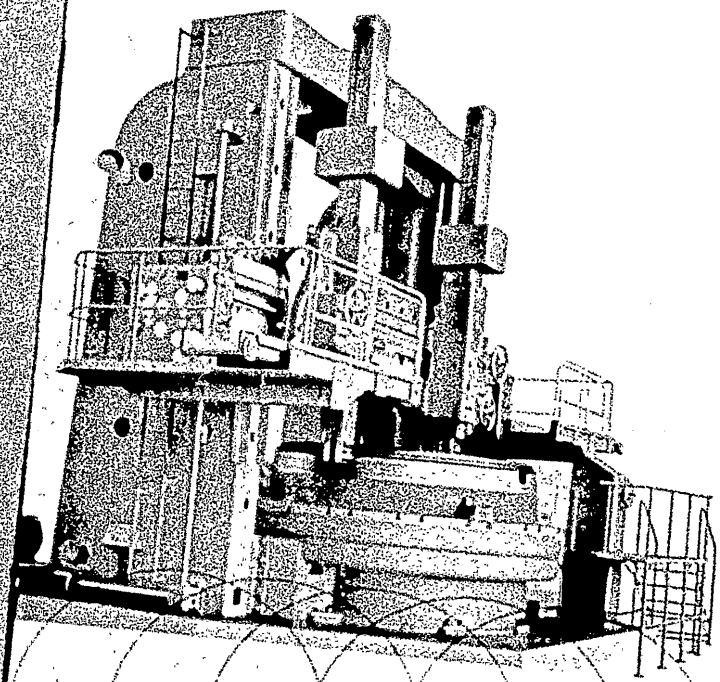
DOUBLE COLUMN VERTICAL TURNING AND BORING MILLS



SK 40
50

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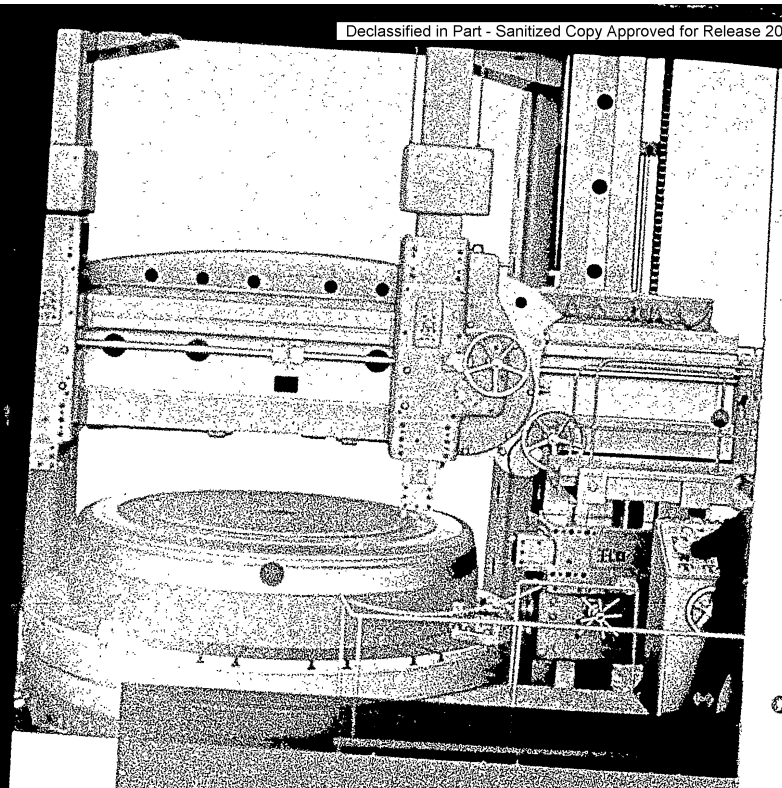

The machines are intended for the heaviest turning operations. The latest [illegible] in the line of heavy machine tools were utilized in the design of both types so that these machines correspond to modern technical progress and satisfy the [illegible] demands of production. They are marked by a high output, economy, precision of work, easy operation and reliability.

OUTSTANDING FEATURES

SK 40 50

Adequately high speed affords high cutting speeds resulting in [illegible] steels and hard alloys

Infinite speed variation permitting most suitable cutting speed [illegible] tool is cutting.

Engagement and disengagement of feeds [illegible] adjustment controlled by conveniently arranged [illegible]

Releasing and clamping of cross [illegible]

Idle times reduced to minimum by reduction [illegible]

Control of entire machine [illegible] Platforms and ladders afford access to [illegible]

Lubrication of all important [illegible] deway and table plate entirely independent [illegible] by sound at night.

Gears manufactured of special steel. Highly [illegible] gears fitted on spare shafts [illegible]

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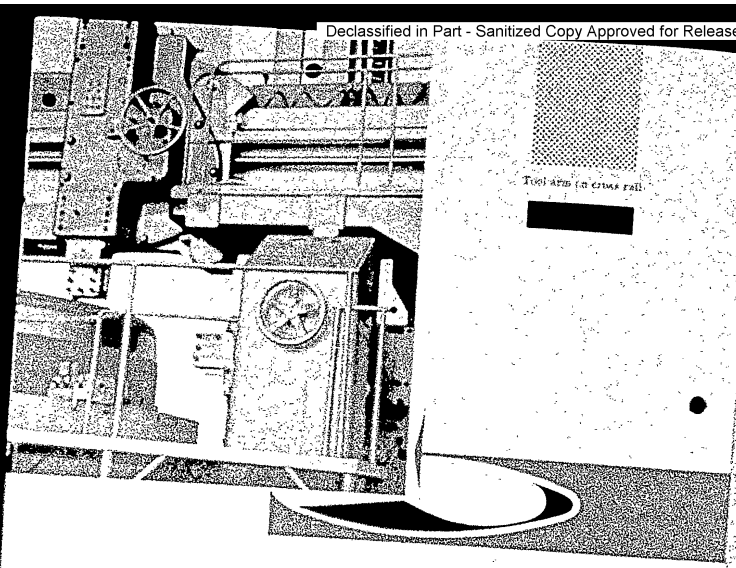


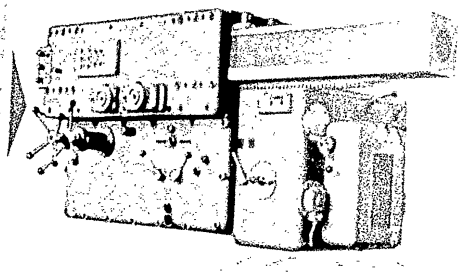
Tool arm in cross rail.

DESCRIPTION

[redacted]

The table plate has a high cross section and is generously reinforced with ribs to avoid distortion by the forces necessary for the clamping. It is provided with a particularly accurate flat guideway and rests in the centre on special antifriction bearings mounted on a fixed pin around which it revolves. The bearings and pin are of sufficient dimensions to withstand the heaviest radial and axial loads. The clamping surface is provided with T-slots and recessed dogs for securing the clamping jaws in position.

The cross rail. The table, column and top cross member form an enclosed frame the rigidity of which is further increased by clamping the cross rail to the columns. The cross rail is guided on both columns and its large cross section and diagonal ribs make it very rigid. The clamping of the cross rail to the front and side surfaces of the guideways of the columns is done by electric motors controlled by push buttons on the control desk. The cross rail is raised and lowered by an electric motor fitted on the top cross member. The motor can only be started when the cross rail is released. The extreme positions of the cross rail are limited by limit switches. The entire control and signalling of the cross rail are centralized on the control desk. The cross rail can only be moved when the drive is at rest and the drive can only be started when the cross rail is clamped to the columns.



Side arm

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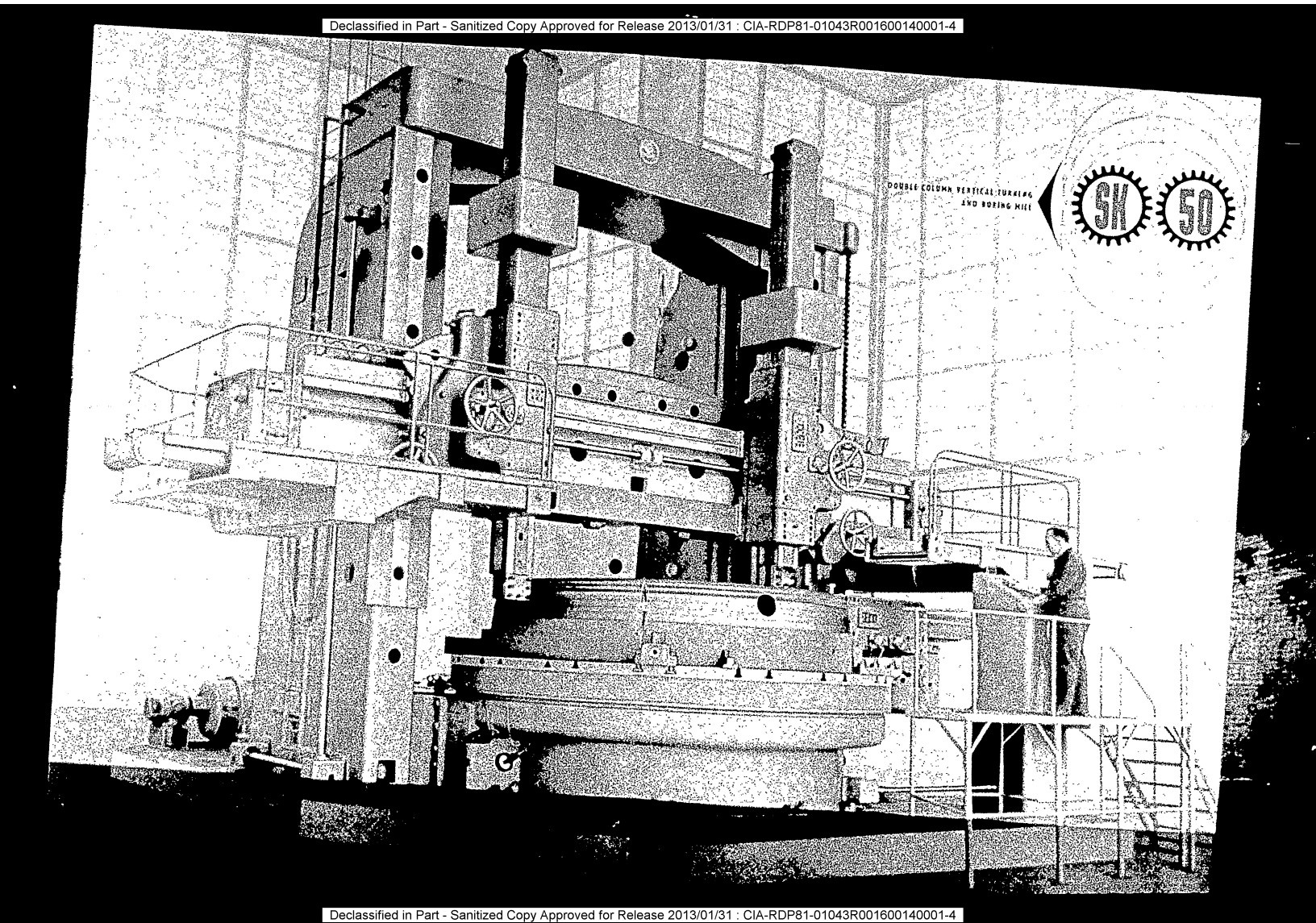

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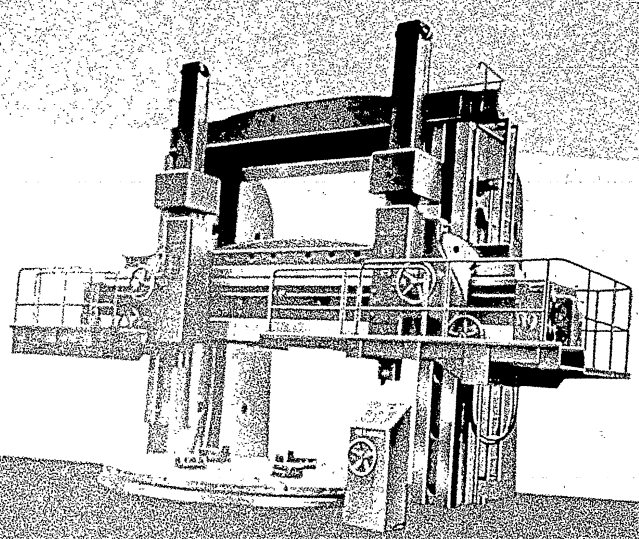
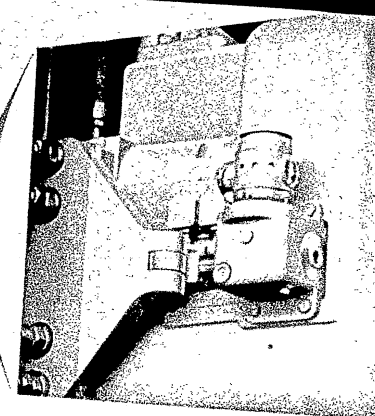


SK 40 50

SECURING OF CROSS RAIL IN POSITION



The tool arms. Two tool arms slide along the cross rail. They are provided with swivelling parts in which the rams are guided, which have a square cross section and into the tapered holes of which the tool heads are inserted. The rams are prismatic and rest on flat guiding surfaces in the direction of the main thrust. The great height and width of the tool arm slide ensure that it is guided smoothly even though the ram may have been moved forward considerably. The two tool arms are mutually entirely independent. They are moved horizontally by a screw, vertically by a pinion and rack. Both tool arms may be moved inward as far as the centre of the table plate. The ram is balanced by a counterweight. Its swivelling part may be swivelled by means of a worm and worm gear and secured in any position. At the end of the cross rail a separate feed box is provided for each tool arm with a motor for rapid travel. Hand wheels for fine horizontal and vertical travel are fitted on the tool arms. The hand travels are [illegible] independent of the power feeds. During power feed or rapid [illegible] may be speeded up or slowed down by means of them. Also fitted on the [illegible] stopping the feeds and rapid travels. Push buttons are [illegible] tool arms. All automatic movements of the tool arms are [illegible] of limit switches. Limit switches are also provided to [illegible] Disc gauges are fitted on the tool arms for a [illegible] gen are adjustable and permit the tool to be set as required for [illegible]

Lubrication. The electric motor driven oil pump draws oil from [illegible] tion guard and oil cleaner and supplies it to the [illegible] a pressure gauge, may be adjusted by means of a [illegible] by 4 built-in thermometers. When the oil temperature [illegible] sounded and a red light switch is on the [illegible] Another electric motor driven oil pump with [illegible] friction bearings of the table plate have their own lubrication.

Platforms. To facilitate operation two platforms are [illegible] out for easier inversion of the workpiece.

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SK 40
SK 50

SPECIAL EQUIPMENT

The side arm is guided on the right hand column and may be lowered below the level of the table plate. It has its own feed box with an electric motor for rapid travel. The horizontal and vertical movements are driven by pinions and racks. The arm is balanced by a counterweight. Dial scales similar to those on the tool arms are arranged on the side arm for a correct setting of the tool for diameter and height. The arm is protected against lifting the cross rail and also against travel beyond its extreme bottom position by means of limit switches. Limit switches are also provided in the extreme positions of the ram.

The taper turning attachment for turning tapers by means of change gears is available for the right hand column. It serves for turning inner and outer tapers with angles of 30' to 12° arranged in 2' increments without swivelling the ram. In conjunction with the swivel of the ram any tapers from 0 to 176 can be turned.

The screwcutting attachment for cutting threads by means of change gears is available for the right hand column and serves for cutting metric threads with pitches from 1 to 56 mm.

Since the majority of gears for taper turning and screwcutting by means of change gears are identical the two attachments are contained in a common design.

When the taper turning attachment is fitted to the feed box of the side arm outer tapers can be turned by means of a setting angles of 4° to 60° arranged in 2° increments.

The gears for the feeds. A pair of gears is available to be inserted into the feed box of the side arm on two pins when the feed box cover is removed. They serve for obtaining feeds of 0.126 to 11.2 mm 0.005" to 0.445" per revolution of the main spindle.

The electrical equipment of the machine is designed for use with 3-phase current three wire. The motor for the rotation and lowering of the cross rail as well as the motor for the rapid traverse of tool arms and ram are provided with a built-in Ward-Leonard set or with the machine.

1 tool arm
2 tool heads
1 grease gun
1 set of spanners

STANDARD EQUIPMENT

1 tool arm on the main tool head
1 motorized universal vertical table to be set on the contactor
1 set of Ward-Leonard set or on the machine
1 drawbar
2 tool heads
1 grease gun
1 set of spanners

Dimensional drawing of machine

Type		A	B	C	D	E	F
SK 40	mm	1670	2400	1125	4500	3500	450
	feet-inches	5'6"	7'11"	3'8"	14'9"	11'6"	1'6"
SK 50	mm	1750	3150	1250	5000	3500	600
	feet-inches	5'9"	10'4"	4'1"	16'5"	11'6"	1'11"

Dimensional drawing of Ward-Leonard set and contactor box

	H	J	K	L	M	N
mm	2800	3650	2050	1000	2500	approximately 5000
feet-inches	9'2"	12'0"	6'9"	3'3"	8'2"	approximately 16'5"

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SPECIFICATION

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SPECIFICATION

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PRAHA CZECHOSLOVAKIA

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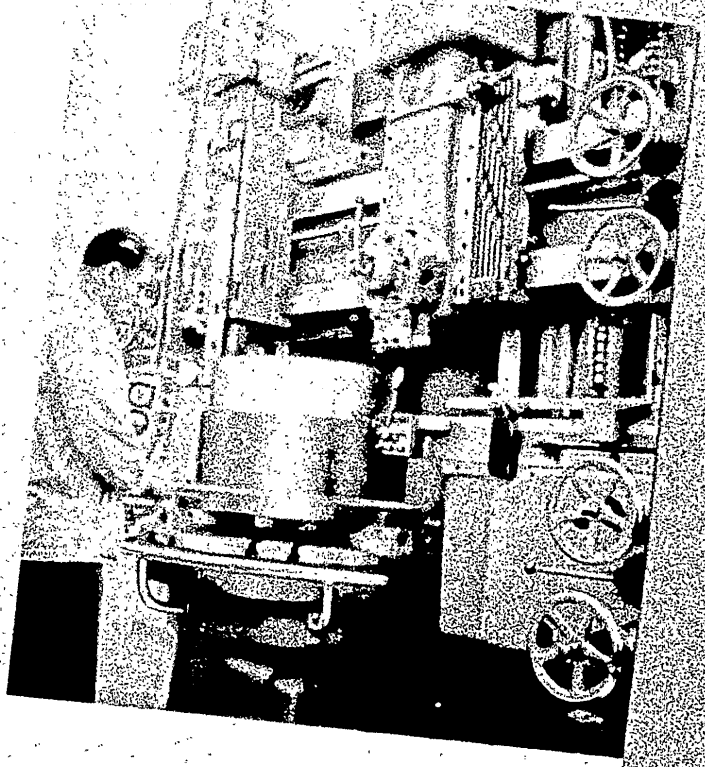

Type SK 12

DOUBLE HOUSING VERTICAL TURNING AND BORING MILL

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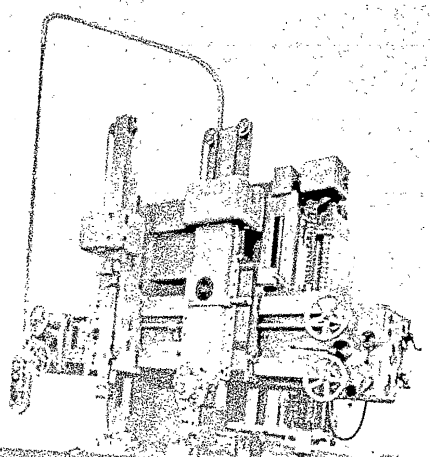

SK 12

Type SK 12

DOUBLE HOUSING VERTICAL TURNING AND BORING MILL

STANKOEXPORT

SK 12

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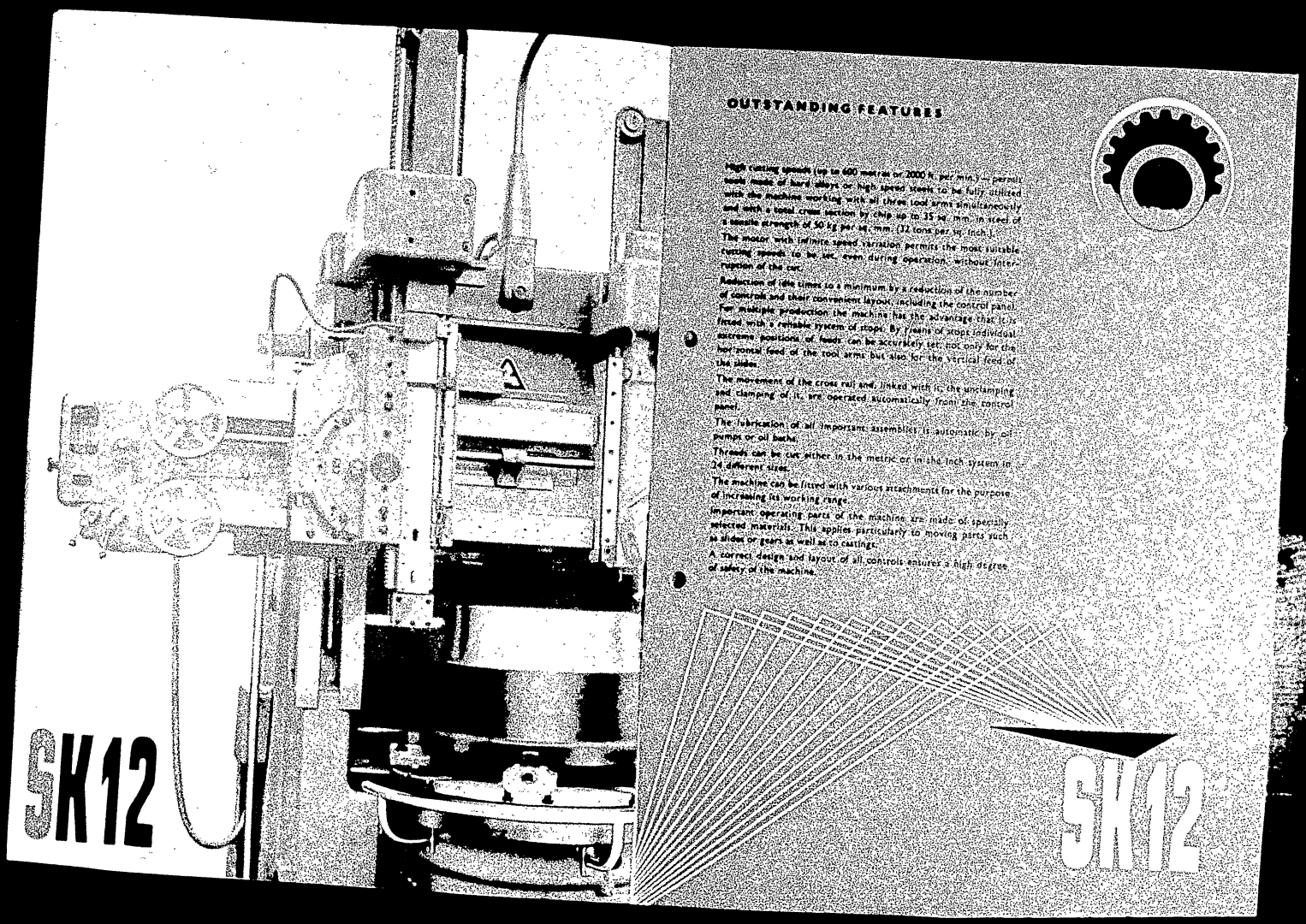

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DESCRIPTION

SK12

The Drive. The machine is driven by a variable speed commutator motor through a flexible coupling and a four speed gear [illegible] the power to the gear rim of the table.

The gear box [illegible] the base box can be removed as a unit. Four speeds are engaged by means of two levers [illegible] and suitable speeds are selected by means of push-buttons on the panel.

The Base. [illegible] by means of large contact surfaces and form a rigid, enclosed unit together [illegible] The rear part of the base carries the main driving motor, in the front part the [illegible]

The Table. [illegible] heavily reinforced with ribs. It is bolted to the large spindle flange, [illegible] made of hardened steel.

[illegible] at the top as well as at the bottom. To allow for the highest [illegible] with machining done at the highest point above the [illegible] continuously in an oil bath.

[illegible] large spindle flange and forms, together with the pinion, [illegible]

[illegible] entire length. It is raised and lowered by means of its own [illegible] The heads rail is guided on the front guideways of the housing and [illegible] are controlled automatically from the control panel. [illegible] of the cross rail feed boxes are fitted from which the drive is transmitted [illegible] and feed shaft.

The Left Hand Rail Arm. The great height and width of the guideways of the arm ensure a smooth movement even when the tool slide is extended considerably. The slide moves in the cast iron body of the arm and is provided, in its lower part, with a tapered hole in which the tool post is fitted. The slide is balanced in any position by a counterweight so that the play between the driving pinion and rack of the slide is always absorbed.

The working movement of the slide and its extreme positions can be set by means of adjustable stops.

The entire rail arm together with the slide are driven by a screw and shaft from the feed box.

On the feed box hand wheels for the vertical and horizontal hand feeds, a lever for engaging the feeds [illegible] traverses as well as other control levers are fitted.

The motor for rapid traverse and the motor and box for automatic feed release are fitted [illegible]

The left hand rail head, together with its feed box has its own equipment for threading and [illegible] by means of gears or also by means of a taper bar.

In order that tapered surfaces can be turned the entire slide with its guide can be swivelled.

The Right Hand Slide Rail Arm. The design of this tool arm, together with its feed box [illegible] same as that of the left hand rail arm. However, this tool arm is not fitted with a threading [illegible] equipment.

It serves mostly for roughing work and is supplied only to the customer's [illegible]

Normally the following rail arm is supplied in place of it.

The Turret Rail Arm. The slide of this tool arm is fitted with a turret head [illegible]

The tool arm is fitted with an automatic feed release by means of adjustable stops.

The vertical movement of the slide is controlled by stops for each tool in the turret head. [illegible] to the accurately set dimension is done by hand.

The slide with the turret head is also balanced by a counterweight. The feeds are [illegible] of the tool arm the design of which is similar to that of the tool arm's described above.

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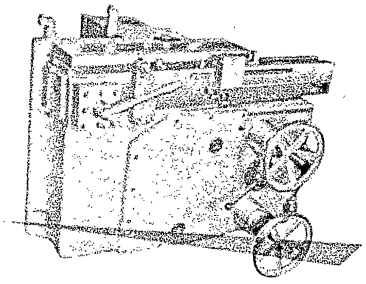

Electric Motors and Electrical Equipment. The machine is equipped as a standard item with a variable-speed electric motor of the main drive unit a [illegible] imum output of 37 kW.

In addition to that the following items are supplied with the machine:

Electric motor for elevation of cross rail.
electric motor for clamping of cross rail.
electric motor for rapid traverse.
electric motor for automatic feed release.
appropriate electric switchgear for these motors and all other control equipment with contactor cabinet.

Lubrication. All parts running in anti-friction bearings are lubricated reliably and automatically by means of special oil pumps and directly by oil baths.

Less important points and plain bearings are lubricated from time to time by hand with oil or with solid lubricants.

The gears in the feed and drive boxes are also lubricated by oil baths.

The oil levels are checked by oil level gauges.

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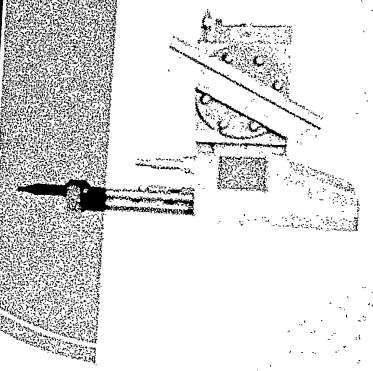


Copying attachment

STANDARD EQUIPMENT

SK 12

STROJEXPORT

OPTIONAL EQUIPMENT (DESIGN),

supplied only to customer's special order.

R. H. rail arm with feed box and automatic feed release

R. H. turret rail arm with feed box and automatic feed release

Side arm with feed box and automatic feed release.

Equipment for cooling of tool.

Railing (for machine without cooling)

Mechanical copying attachment (by means of taper bar) for flat tapers and curves

IT IS RECOMMENDED TO ORDER THE MACHINE IN THE FOLLOWING DESIGN:

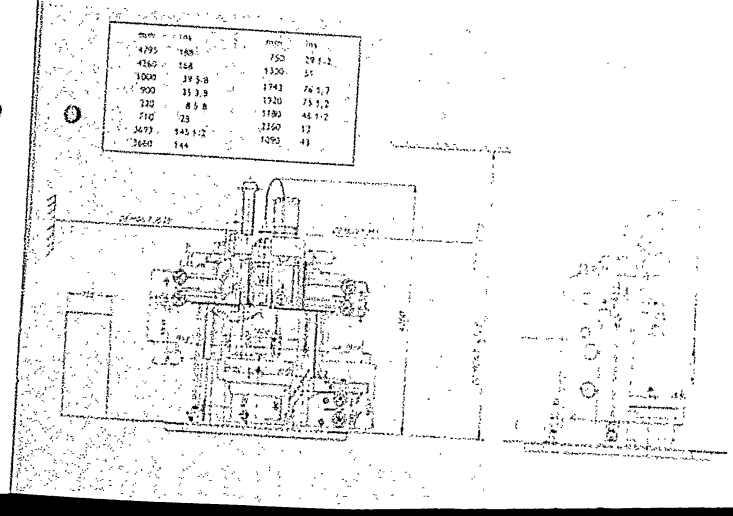
a) L. H. slide rail arm including feed box and automatic feed release, including threading equipment, including taper turning equipment

b) R. H. turret rail arm with feed box and automatic feed release

c) Side arm with feed box and automatic feed release

ŠKODA

mm	ins	mm	ins
4795	188	750	29 1/2
4260	168	1330	52
1000	39 3/8	1743	68 1/2
900	35 3/8	1920	75 1/2
220	8 5/8	1180	46 1/2
710	28	3260	128
3693	145 1/2	1093	43
2660	104		



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SPECIFICATION

Working Ranges			
Maximum swing when turning with side arm	mm	1250	4' 1"
Maximum swing when turning with rail arm (with side arm lowered below table)	mm	1350	4' 5"
Maximum vertical distance, tool holder of rail arm to table	mm	1000	3' 3 1/2"
Maximum vertical distance, tool holder of side arm to table	mm	850	2' 9 1/2"
Maximum travel of rail arm slide	mm	710	2' 4"
Maximum travel of side arm slide	mm	500	1' 7 1/2"
Maximum travel of turret rail arm slide	mm	550	1' 9 1/2"
Maximum weight of work-piece	kg	4000	8820 lbs
Maximum stress on face plate	kgm	2250	16250 ft. lbs
Table:			
Diameter of face plate	mm	1250	4' 10 1/2"
Infinitely variable speed of table arranged in 4 ranges, for clockwise as well as counter-clockwise rotation:			
range I	r.p.m.	3.35 to 14	
range II	r.p.m.	7.1 to 31	
range III	r.p.m.	16.8 to 68	
range IV	r.p.m.	37 to 150	
Range of infinite speed variation		1 : 4	
Power of motor: within table speed range of	r.p.m.	8 to 150	
	kW	22 to 27	
within table speed range of	r.p.m.	3.55 to 8	
	kW	12 to 22	
Feeds:			
Number of feeds		24	
Rate of feed (mutually independent for the two tool arms — horizontal, vertical or slanting), per rev.	mm	0.06 to 9	0.0024" to 0.36"
Driver:			
1 main variable speed commutator motor: maximum output	kW	37	
at speed of	r.p.m.	2300 to 1800	
constant torque at	r.p.m.	1800 to 580	
1 motor for rapid traverse of tool arms; output (5 minute rating)	kW/5min.	1.5	
speed	r.p.m.	2800	
1 motor for automatic feed release: output	kW	0.183	
speed	r.p.m.	2800	
1 motor for elevation of cross rail: output	kW/5min.	4.5	
speed	r.p.m.	2800	
1 motor for clamping and releasing of cross rail output	kW/5min.	0.8	
speed	r.p.m.	2800	
Operational Data:			
Number of metric threads cut		24	
Range of pitch		1 to 28	
Number of inch threads cut		24	
Range	t.p.i.	20 to 3	
Number of tapers turned by means of change gears		12	
Apex angles of tapers		30 to 168°	
Apex angles turned with tilted slide		8 to 172°	
Dimensions and Weights:			
Floor space required by machine (width x length)	mm	3850 x 1940	12'7" x 6'4"
Floor space required by contactor cabinet	mm	750 x 1100	2'6" x 3'7"
Weight of machine with three tool arms, approx.	kg	14400	31600 lbs

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS!

The development of manufacturing technology is closely linked with the development of machine tools, which are continuously being adapted to new requirements of efficient machining. The designations, illustrations and particulars therefore do not always exactly agree with the latest design of machine and consequently are not binding.

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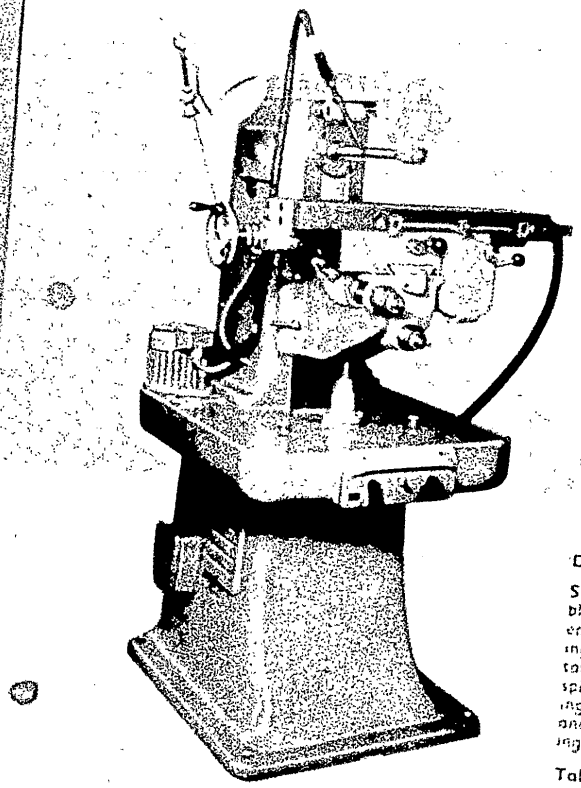
HORIZONTAL MILLING MACHINE Model F1J



This machine is designed for a general line of light manufacturing work and is equally well-suited both for the single part and mass production. The wide spindle speed and feed range enables economical milling of steel and light metals.

Outstanding features:

Ease of operation - Accurate spindle mounting - Possibility of applying HV 1 Vertical milling head - Guaranteed interchangeability of all spare parts.

DESCRIPTION

Spindle. The main spindle rotates in a double-row roller bearing with taper bore which enables accurate elimination of play. Starting, stopping and reversing of the spindle rotation is effected by the master switch. The spindle speeds are changed by the pole changing switch of a three-speed electric motor and by operating the lever of the gear shifting mechanism.

Table. The longitudinal table feed is by power and by hand. In the cross and vertical directions the feeds are by hand only. The longitudinal feed speeds are changed by two change gears.

Lubrication. The main spindle bearings have automatic circulation system of lubrication. All gears inside the column are running in an oil bath. The table and knee mechanism is lubricated from central oilers at the top of the column.

Cooling system. The coolant is supplied to the work by an electric pump from a coolant tank provided

Standard equipment: Electric motor with pole changing switch, electrical installation, electric coolant pump with piping, electric lighting for 24 Volts, milling arbor dia. 16 mm x 200 mm with taper according to the main spindle, clamping screws, grease gun, set of spanners, operating instruction booklet.

Optional equipment: Vertical milling head Type HV 1 with spindle taper 3 on a plane perpendicular to the main spindle axis. This milling head makes possible many operations for which a vertical milling machine would be necessary.

Taper in HV 1 spindle Morse No. 2

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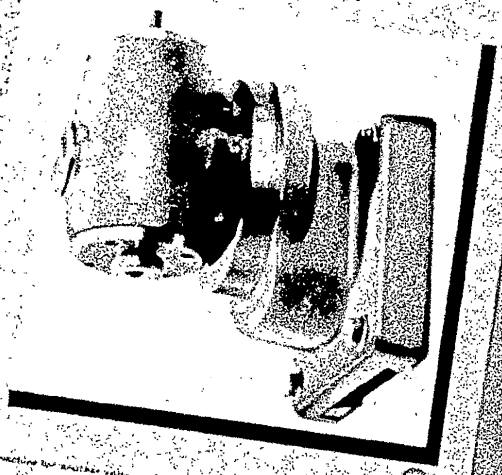
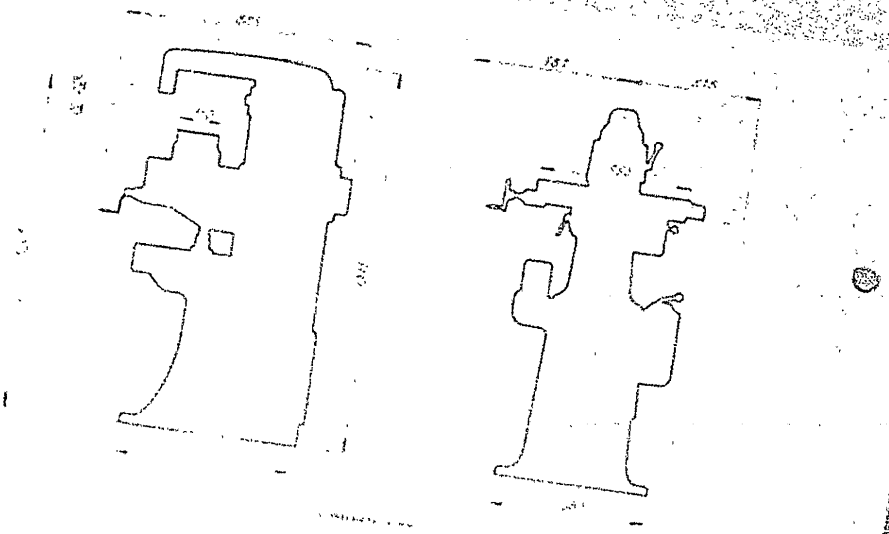
SPECIFICATIONS



IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.



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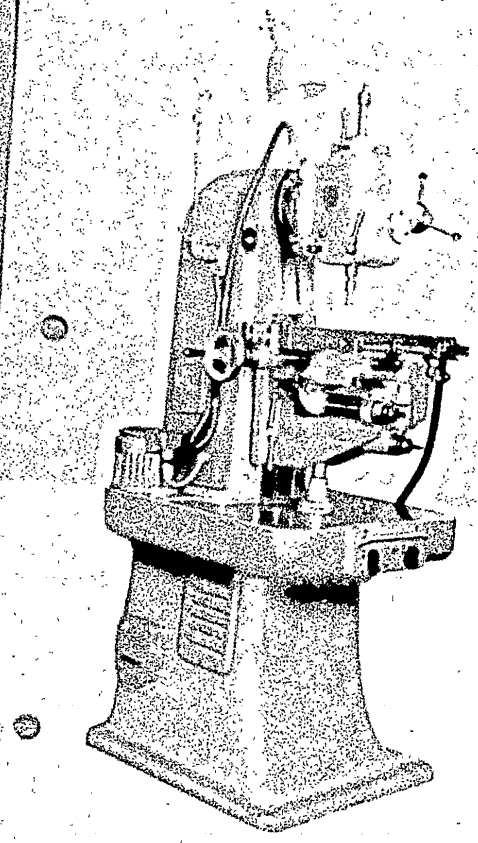
VERTICAL MILLING MACHINE Model

F1S



The machine is designed and built to handle smaller work in the single part as well as in the quantity production. The wide spindle speed and feed range enable economical machining of steel and light metals.

Outstanding features:
Ease of operation - Accurate spindle mounting - Milling head - Guaranteed interchangeability of all spare parts.

DESCRIPTION:

Spindle. The main spindle rotates in a double-row roller bearing with taper bore which enables accurate elimination of play. Starting, stopping and reversing of the spindle rotation is done by the master switch. The spindle speeds are changed by the pole changing switch of a three-speed electric motor and by operating the lever of the gear shifting mechanism.

Table. The longitudinal table feed is by power and by hand. In the cross and vertical directions the feeds are by hand only. The longitudinal feed speeds are changed by two change gears.

Lubrication. The main spindle bearings have spray system of lubrication. The table and knee mechanism is lubricated from central oilers. The other contact surfaces are lubricated by oilers.

Cooling system. The coolant is supplied to the work by an electric pump from a coolant tank provided at the top of the column.

Standard equipment: Electric motor with pole changing switch, electrical installation, electrical coolant with piping, electric lighting for 24 Volts, milling arbor disc 16 mm × 200 with taper according to the main spindle, clamping screws, grease gun, set of spanners, operating instruction booklet.

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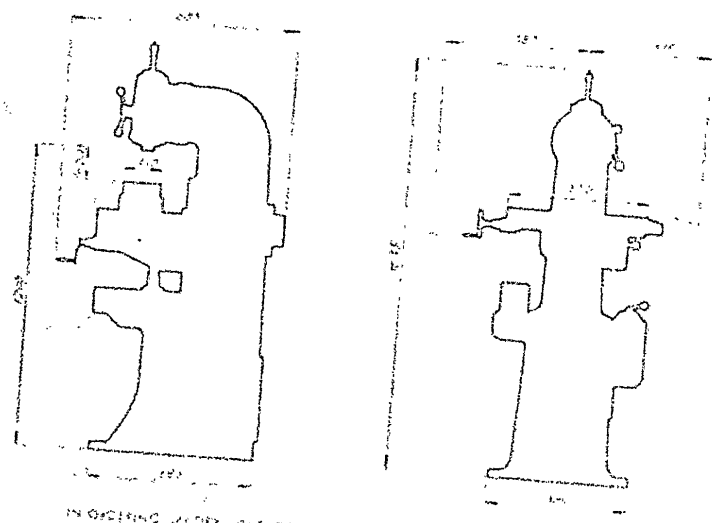
SPECIFICATIONS

Working surface of tools swiftly lengths	mm	150 × 350	[illegible]
Number, width of table T-slots	mm	[illegible]	[illegible]
Longitudinal feed of table by hand by power	mm	215 × 260	[illegible]
Cross feed of table by hand	mm	125	[illegible]
Vertical feed of table by hand	mm	200	[illegible]
Taper in spindle standard ISA		30	[illegible]
on request Morse		2	[illegible]
Diameter of spindle in its front bearing	mm	41	[illegible]
Vertical adjustment of spindle	mm	40	[illegible]
Spindle head swivels in either direction		45°	[illegible]
Max. lateral distance, centreline of spindle to working surface of table	mm	200.0	[illegible]
Distance, centreline of spindle to column guide	mm	165	[illegible]
Distance, centreline of spindle to column	mm	195	[illegible]
Spindle speeds, 4 ranges, 6 speeds each			
Range I, on request	r.p.m.	190 – 1070	190 – 1070
Range II, standard	r.p.m.	270 – 1540	270 – 1540
Range III, on request	r.p.m.	380 – 2160	380 – 2160
Range IV, on request	r.p.m.	540 – 3070	540 – 3070
Number of feeds		18	18
Speed of longitudinal feeds ranging from A on request	mm/min	12 – 195	[illegible]
B standard		per minute	
Main drive motor: Output	mm/min	24 – 775	[illegible]
Speed		per minute	
Floor space required (width × length)	HP	1.5 0.8 0.4	1.5 0.8 0.4
Weight of machine: with standard equipment	r.p.m.	1400/950/715	1400/950/715
with packing	mm	890 × 1110	35" × 40"
with seaworthy packing	kg	500	1100 lbs
Contents boxed	kg	600	1320 lbs
	kg	650	1430 lbs
	m³	1.9	67 cu. ft.

Normally, the machines are supplied with A. C. motors to suit 3 × 380 Volts, 50 cycles. If a machine for another voltage is required kindly ask for our offer.



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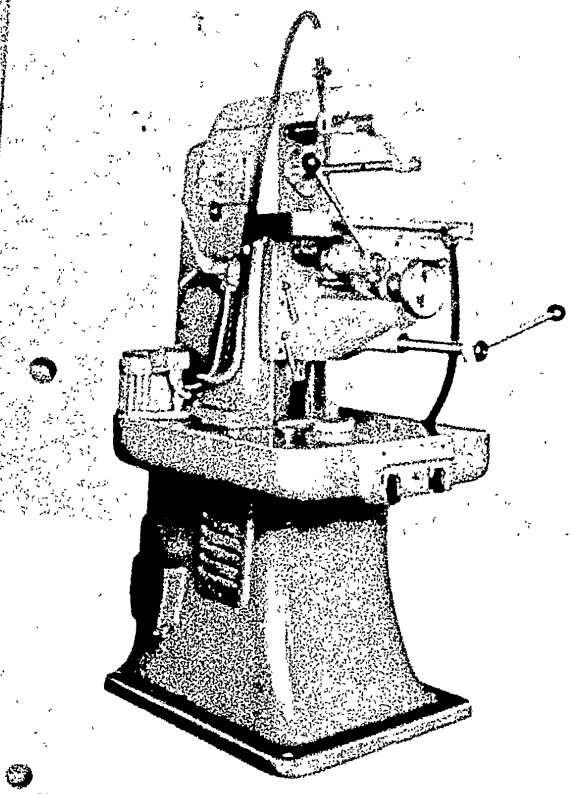
TWO-LEVER HORIZONTAL MILLING MACHINE Model

F1J2



The machine is designed and built to handle smaller work especially in the mass production. The wide spindle speed range enables economical machining of steel and light metals.

Outstanding features: Ease of operation
Accurate spindle mounting
Possibility of applying HV 1 Vertical Milling Head
Guaranteed interchangeability of all spare parts

Spindle. The main spindle rotates in a double-row roller bearing with taper bore which enables accurate elimination of play. Starting, stopping and reversing of the spindle rotation is done by the master switch. The spindle speeds are changed by the pole changing switch of a three-speed electric motor and by operating the lever of the gear shifting mechanism.

Table. The longitudinal table feed is by power and by hand. In the cross and vertical directions the feeds are by hand only. The longitudinal feed speeds are changed by two change gears.

Lubrication. The main spindles bearings have automatic circulation system of lubrication. All gears inside the column are running in an oil bath. The table and knee mechanism is lubricated from central oilers.

Cooling system. The coolant is supplied to the work by an electric pump from a coolant tank provided at the top of the column.

Standard equipment. Electric motor with pole changing switch, electrical installation, electric coolant pump with piping, electrical lighting for 24 Volts, milling arbor dia. 16 mm x 200 with taper according to the main spindle, clamping screw, grease gun, set of wrenches, operating instruction booklet.

Optional equipment: Vertical milling head type HV 1 with spindle swivelling in a plane perpendicular to the main spindle axis. This milling head makes possible many operations for which a vertical milling machine would be necessary.

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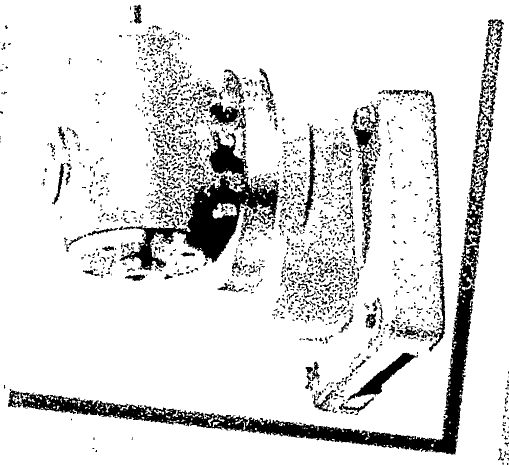

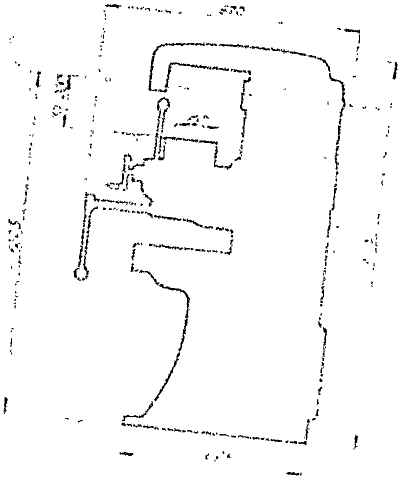

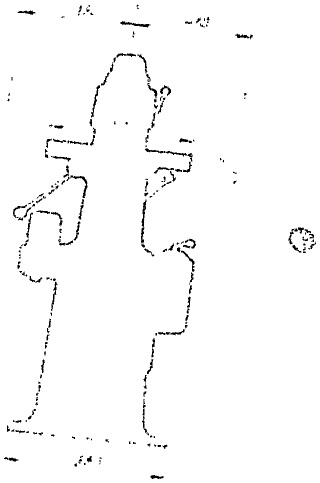

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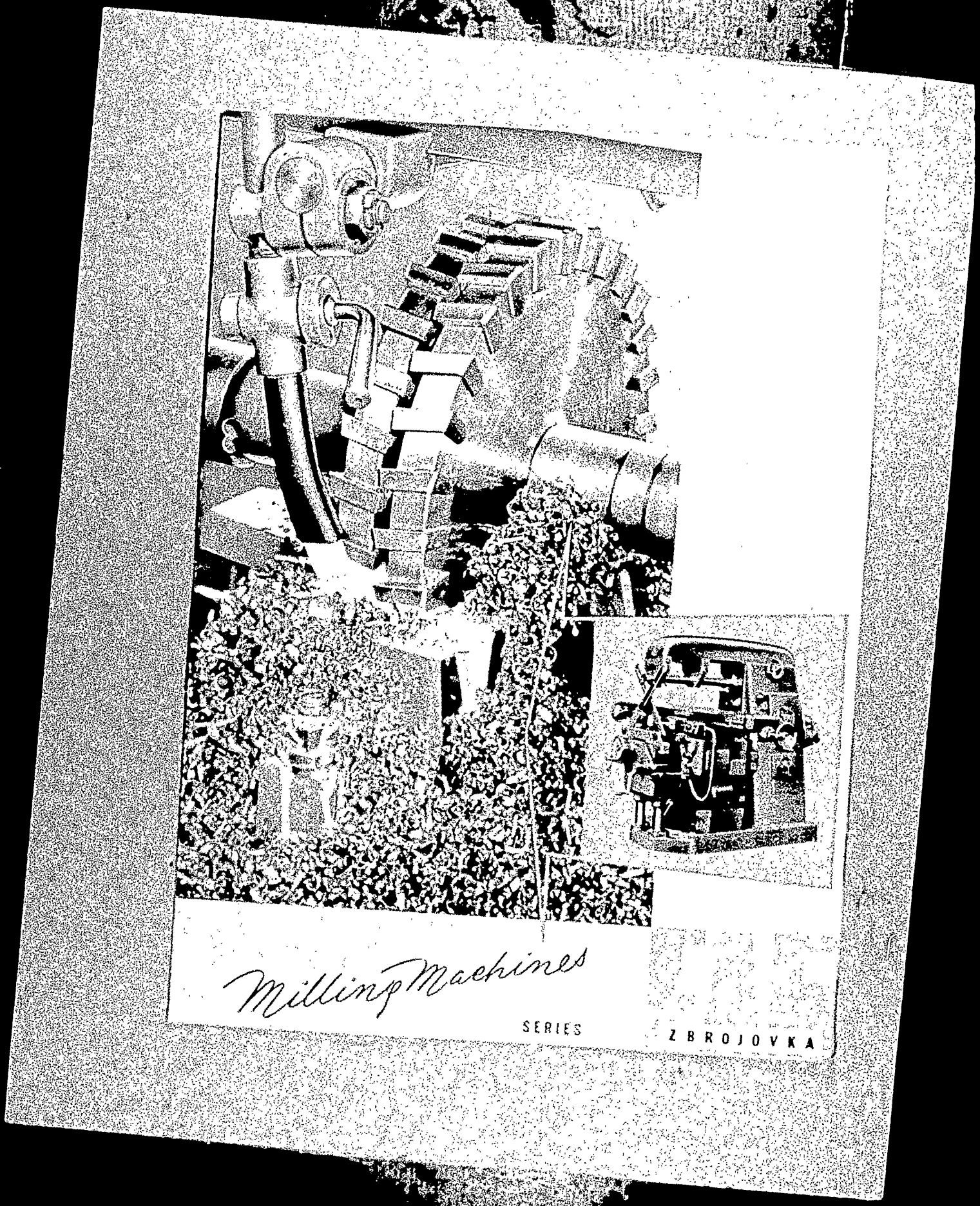

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Milling Machines SERIES

FWD

ZBROJOVKA

Machines of this series are intended for heavy duty milling. They ensure quiet and accurate operation without any vibrations and shocks even at maximum outputs. A wide spindle speed and feed range enables roughing and finishing of all commonly used metals and alloys and provides for a better utilization of these machines.

OUTSTANDING FEATURES:

- Sturdy construction of column and knee, reinforced by cylindrical supports.
- An especially wide range of spindle speeds and power feeds with their high upper values.
- High-speed power rapid traverse of table in all directions.
- Rapid start up to rated feed drive.
- Control box and a duplicated controls.
- Special slide designed milling speed calculator.
- Table with a controlled feed release.
- Facility for a adjustment of the vertical machines by means of slip gauges or on an indicator.
- Lubrication system for the entire driving mechanism.
- Accurate construction and loading of the vertical screw spindle.

THE MACHINES ARE BUILT IN THREE STYLES:

Horizontal Millers are fitted for light milling jobs.

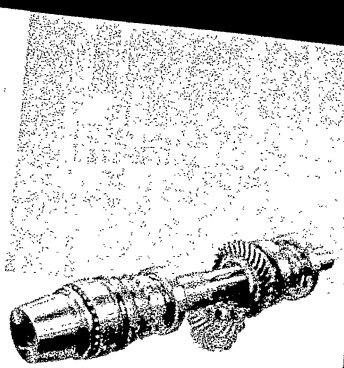
Vertical Millers with an inclining head and vertical spindle additionally arranged for power feed to the circular milling attachment.

Universal Millers with an inclining table arranged for power drive to the work spindle and of the vertical dividing head and for power feed to the circular milling attachment. These machines are also suitable for jobs requiring the rack milling attachment. In addition to face milling they also enable circular milling, cutting of gears, cams, spirals, milling of cams, etc.

DESCRIPTION

SPINDLE

Spindle mounting. On its front end the spindle is mounted in a precision double-row roller bearing with a taper hole enabling a very fine adjustment of the play. Also the high accuracy of the other bearings offers a guarantee for an exceptionally accurate spindle mounting.



SPEED RANGE

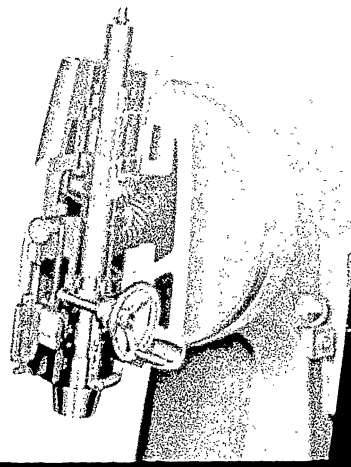
The unusually wide spindle speed range enables the machining of different kinds of materials, from high tensile steels to non-ferrous metals.
The spindle speeds may be changed in the following steps: 18, 22, 28, 35, 45, 56, 71, 93, 112, 140, 180, 224, 280, 355, 450, 560, 710, 920, 1120, 1400 revs. per min.

OVERARM

The Horizontal and Universal Millers are provided with two arbor supports. The [illegible] cation of the arbor guide bushes. The oil supply into the bushes is [illegible]

SPINDLE HEAD

With the vertical machines the vertical adjustment of spindle is accomplished by [illegible] head and is read on an indexing ring. The spindle stroke is limited by a reversing [illegible] stop. The milling depth is adjusted by means of slip gauges or on an indicator incorporated in the upper stop block. By the handle on the left hand side of the head the spindle sleeve with the spindle is lowered to the adjusted position. The head swivels up to 45° in both directions and may also be secured in any required position.



SPINDLE DRIVE

The spindle is driven by a flanged motor bolted to the rear of the column. Starting of the motor and [illegible] axis of the spindle is done by a push button. Another push button serves for stopping and braking the motor. These two push buttons located at the front of the crosstie of [illegible] a complete Touch Bear Control for starting and stopping the spindle drive is provided on the left hand. The motor brake is in action as long as the STOP button is being pressed down.
The load of the main motor is checked on a built-in ammeter, which is provided with a red [illegible] indicating the maximum permissible input power for the required speeds.
The direction of the spindle rotation is controlled by the master switch on the right-hand side of the column.

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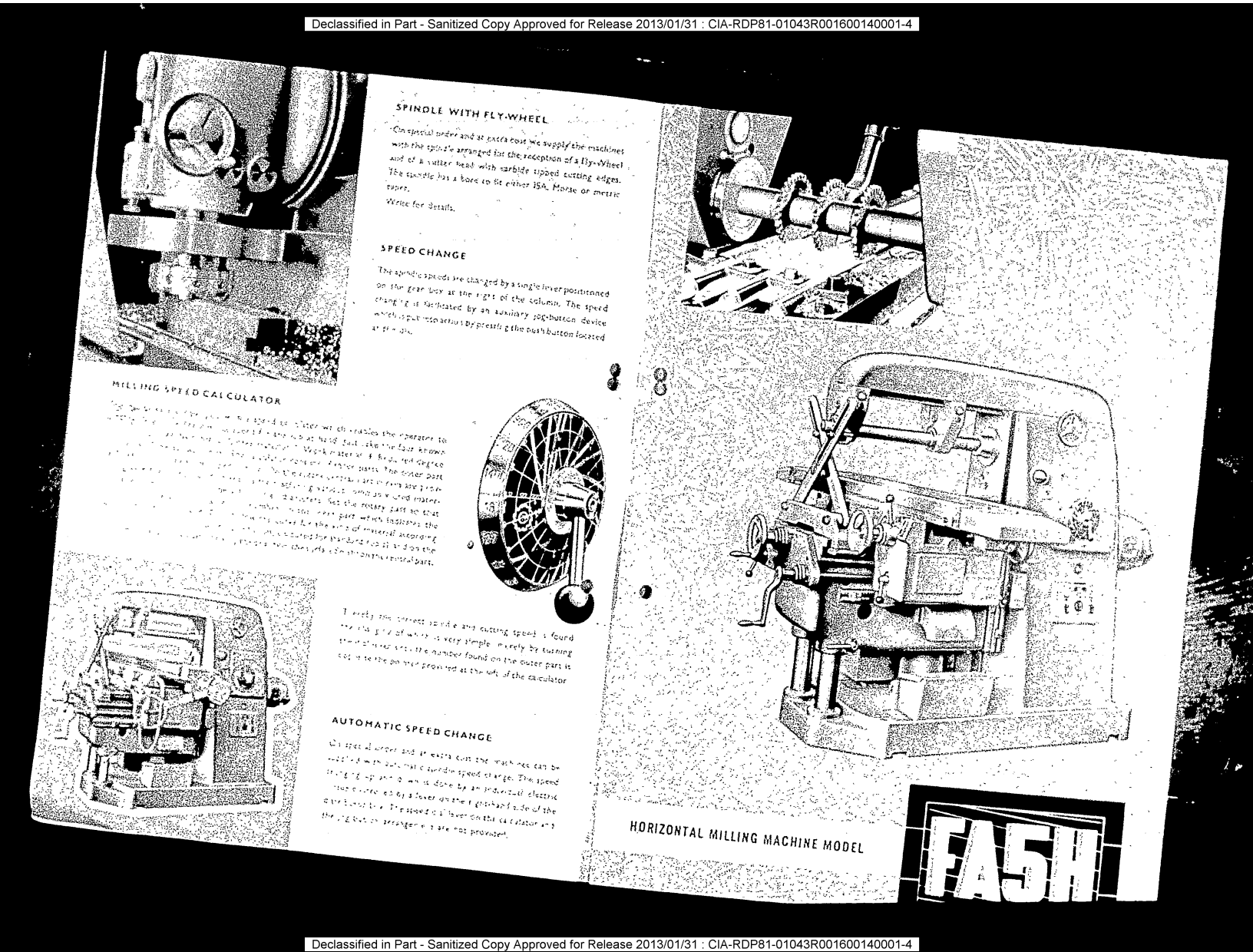

SPINDLE WITH FLY-WHEEL

On special order and at extra cost we supply the machines with the spindle arranged for the reception of a fly-wheel and of a cutter head with carbide tipped cutting edges. The spindle has a bore to fit either 15A, Morse or metric taper.

Write for details.

SPEED CHANGE

The spindle speeds are changed by a single lever positioned on the gear box at the right of the column. The speed changing is facilitated by an auxiliary jog-button device which is put into action by pressing the push button located at the side.

MILLING SPEED CALCULATOR

AUTOMATIC SPEED CHANGE

HORIZONTAL MILLING MACHINE MODEL

FASH

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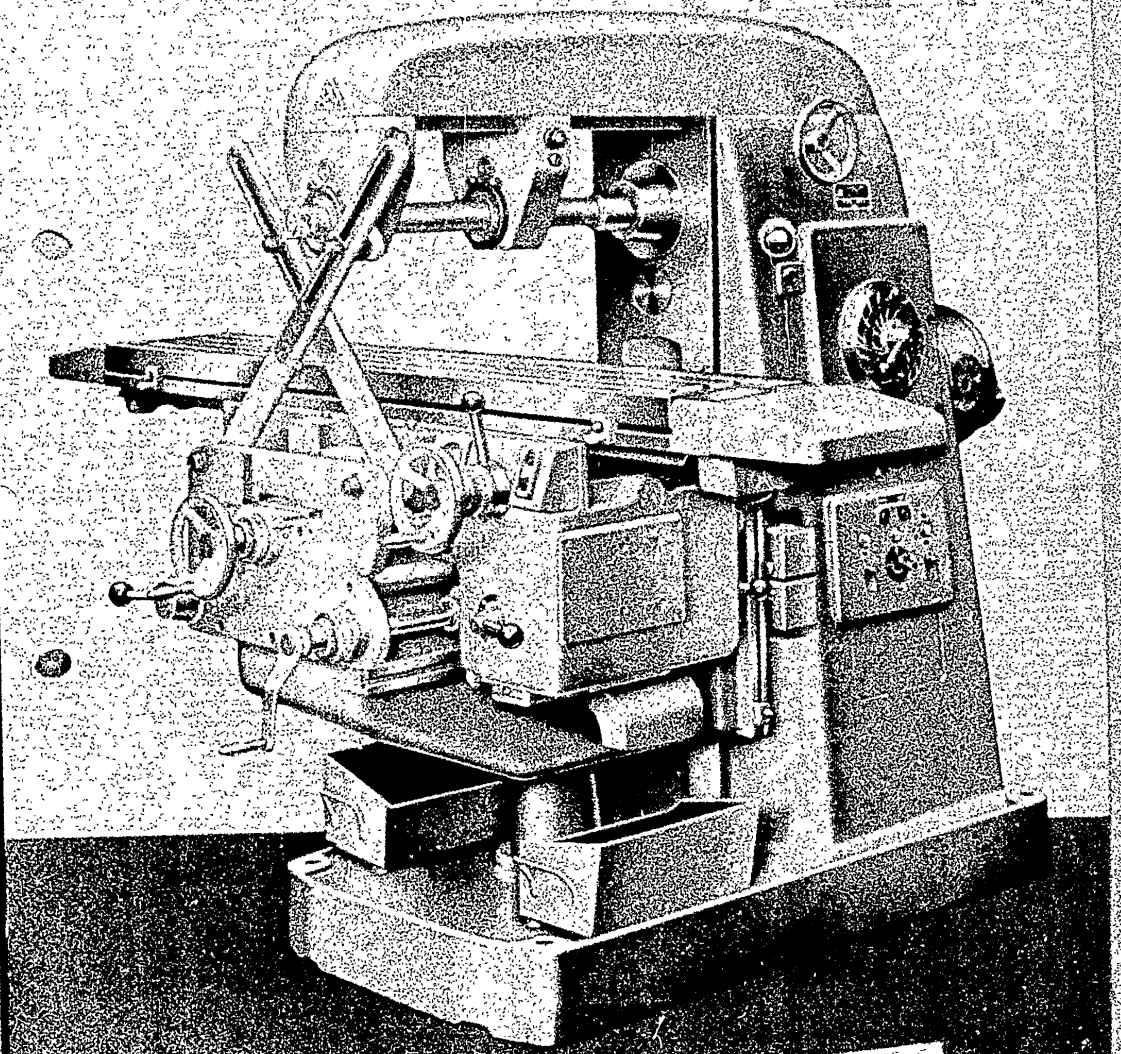
FA4H



PLAIN MILLING MACHINE Model FA4H

TOS

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SPECIFICATIONS

FA4V

Table: Working surface: width	ins.	12.6
length	ins.	63
Number of T-Slots		3
Width x distance of T-Slots	ins.	0.71×2.76
Longitudinal travel: by hand	ins.	39.8
by power	ins.	39.4
Cross travel: by hand	ins.	14.3
by power	ins.	14
Vertical movement: by hand	ins.	17.1
by power	ins.	16.7
Spindle: Standard taper hole	ISA	70
On demand metric	No.	50
Morse	No.	5
Distance from spindle nose to top of table: maximum ISA/metr.	ins.	19.7/18.9
minimum ISA/metr.	ins.	0
Distance from centerline of spindle to column	ins.	13.8
Head swivels in both directions		45°
Vertical adjustment of spindle	ins.	3.35
Spindle speeds: number		12
standard series	R. p. M.	32—1400
high series	R. p. M.	45—2000
Feeds: Number		35
Range of longitudinal and cross feeds	ins./min.	13/32—49
Range of vertical feeds	ins./min.	0.1—12.5
Power rapid traverse: Longitudinal and cross	ins./min.	126
Vertical	ins./min.	31.5
Driven: Main motor: Speed	R. p. M.	1430
Input	HP	7.5
On demand: Input	HP	10
Feed motor: Speed	R. p. M.	1390
Input	HP	1.5
Shipping data: Floor space required	ins.	77×83.5
Weight of machine: with standard equipment	lbs.	5850
with railway packing	lbs.	6620
with seaworthy packing	lbs.	7,300
Contents boxed	cu. ft.	315

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operating instructions.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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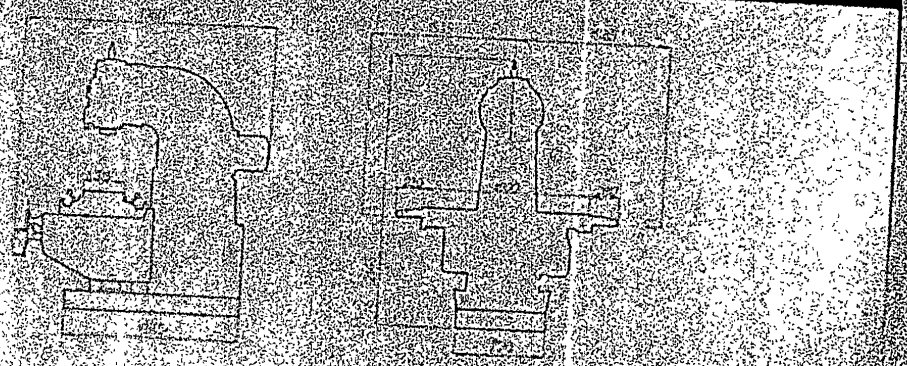

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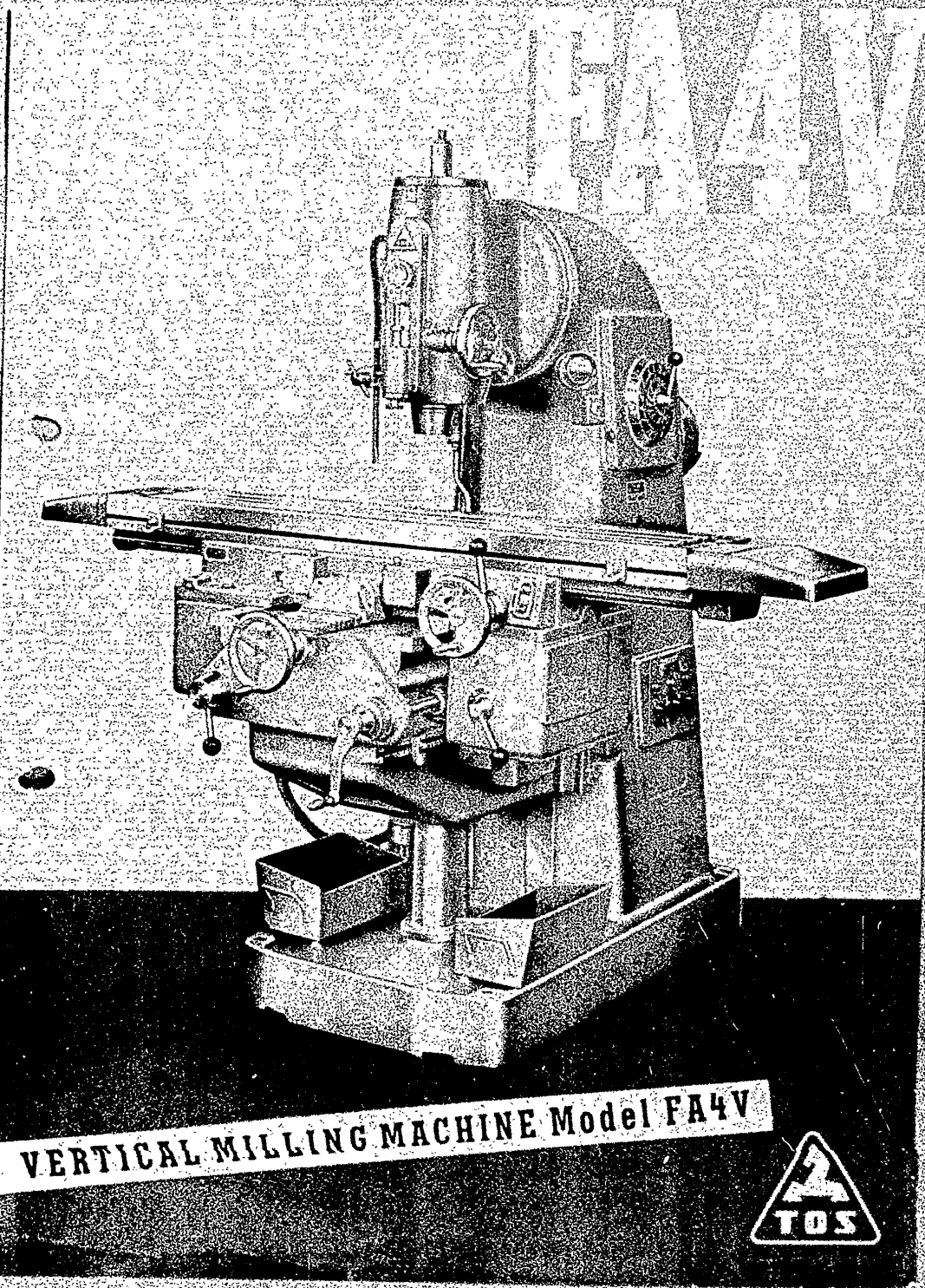

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SPECIFICATIONS

FAZH

Table: Working surface: width	Ins.	7.87
length	Ins.	39.4
Number of T-Slots	Ins.	3
Width x distance of T-Slots	Ins.	0.55 x 1.66
Longitudinal travel: by hand	Ins.	25.2
by power	Ins.	24.8
Cross travel: by hand	Ins.	8.8
Vertical movement: by hand	ISA	14.75
Spindle: Standard taper hole	No.	24
On demand metric	No.	32
Morse	Ins.	3
Diameter in front bearing	Ins.	2.16
Distance from centerline of spindle to top of table: maximum	Ins.	15.7
minimum	Ins.	1
Distance from spindle nose to inside of arbor support	Ins.	13.6
Distance from centerline of arbor to underside of overarm	Ins.	4.33
Distance from column to brace	Ins.	18.9
Spindle speeds: number	R. p. M.	12
standard series	R. p. M.	63—2600
high series		90—4000
Longitudinal table feeds: Number	Ins./Min.	13
Range	Ins./Min.	9/16—37
Power rapid traverse: Longitudinal	R. p. M.	110
Drive: Main motor: Speed	HP	1430
input	R. p. M.	3.25
Feed motor: Speed	HP	2770
input	Ins.	0.7
Shipping data: Floor space required	lbs.	54.5 x 59.5
Weight of machine: with standard equipment	lbs.	1960
with railway packing	lbs.	2200
with seaworthy packing	Ins.	2540
Size of case	cu. ft.	55 x 55 x 55
Contents boxed		95

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operator's instruction booklet.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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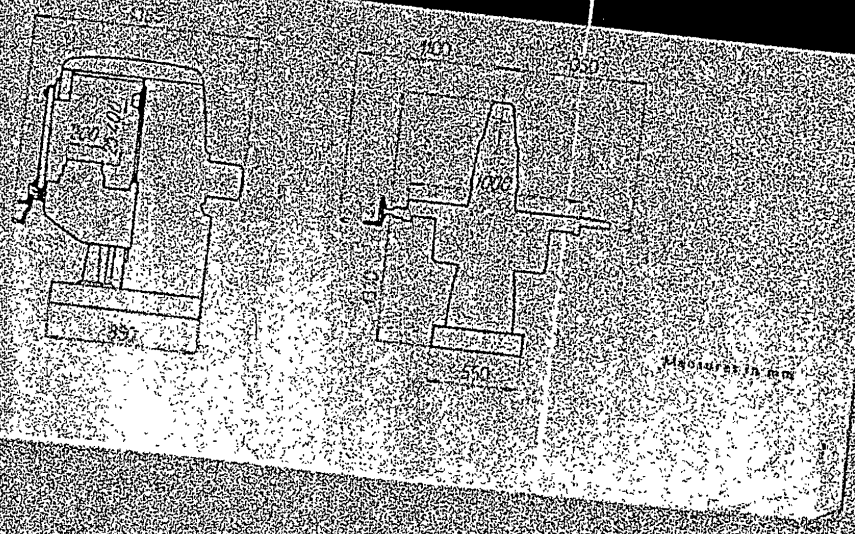

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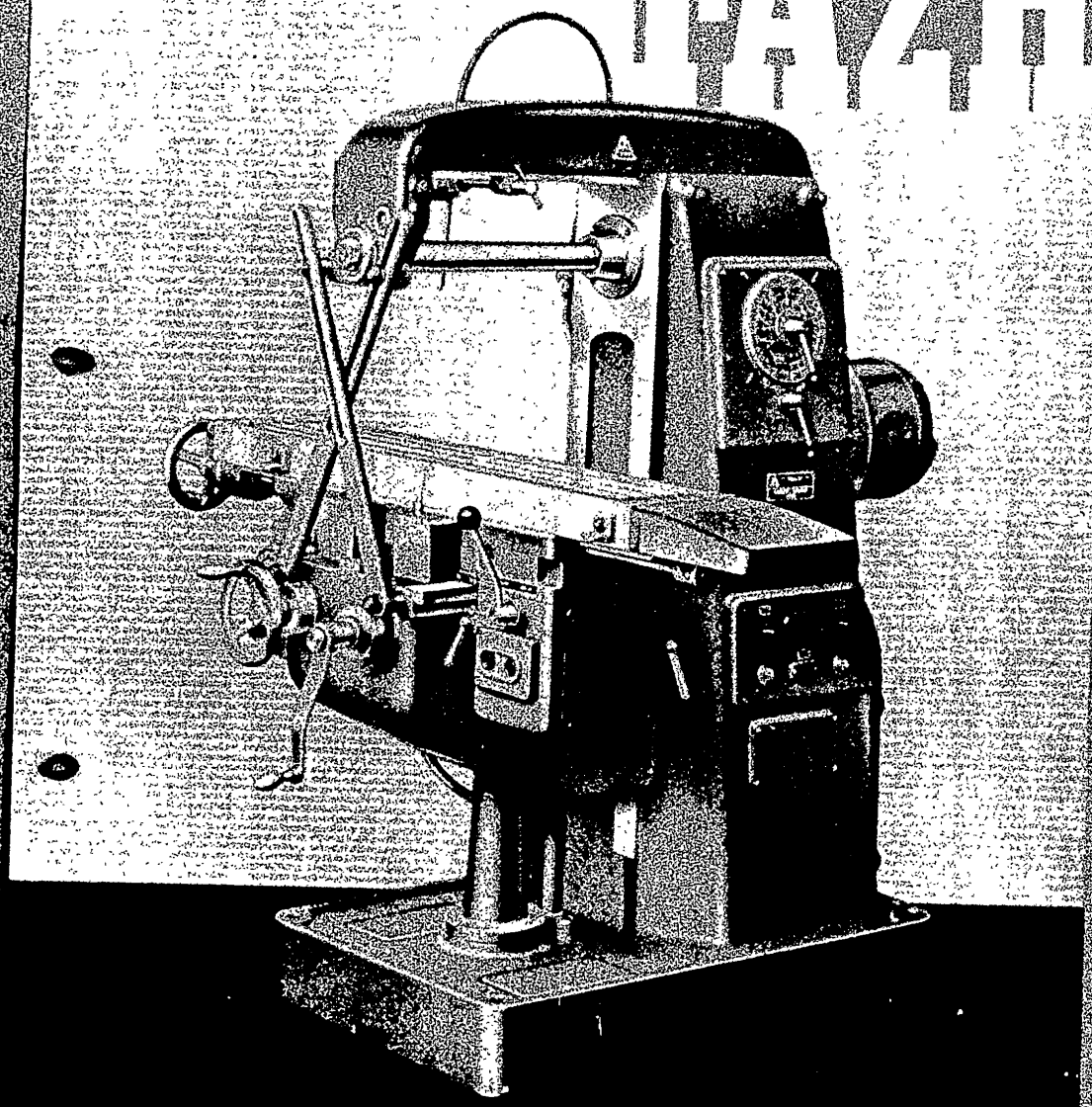
FA2H



PLAIN MILLING MACHINE Model FA2H

TOS

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SPECIFICATION

Copying range: length	mm	320	12 9/16"
depth	mm	110	4 5/16"
width	mm	250	9 27/32"
Clamping area of table: width	mm	200	7 7/8"
length	mm	1000	39 11/32"
Number of T-slots of table		3	
Width × spacing of T-slots	mm	14×42	35 64"×1 21/32"
Longitudinal movement of table: hand	mm	640	25 3/16"
power	mm	630	24 25/32"
Transverse movement of table: hand	mm	225	8 27/32"
Vertical movement of table: hand	mm	375	14 3/4"
Taper in spindle: standard		Sleep, size 40	
on request		No. 4 Morse	
Diameter of spindle in front bearing	mm	55	2 5/32"
Vertical adjustment of spindle	mm	65	2 17/32"
Swivel of headstock in either direction		45°	
Distance, bottom end of spindle to clamping surface of table: maximum	mm	375	14 3/4"
minimum	mm	0	0
Distance, axis of spindle to guideways of housing	mm	250	9 27/32"
Spindle speeds: number		12	
range: standard	r. p. m.	63 to 2800	
high	r. p. m.	90 to 4000	
Longitudinal feeds: number		13	
range, per minute	mm	14 to 900	9/16" to 35 3/8"
Rapid traverse: longitudinal, per minute	mm	2200	7' 2"
Motor for drive of spindle: speed	r. p. m.	1430	
output	HP	3.25	
Motor for feeds: speed	r. p. m.	2770	
output	HP	0.7	
Motor of hydraulic oil pump	HP	0.7	
Floor space required	mm	1385×1510	4' 7"×5'
Weight of machine with standard equipment	kg	1200	2650 lbs
Shipping weight of machine	kg	1350	2980 lbs

A	B	C	D	E
1385	1640	1510	300	730
545	645	595	119	290

STANDARD EQUIPMENT

Milling arbor with clamping screw, cooling equipment, electrical equipment, 1 grease gun, 1 set of spanners, 1 operating instruction book.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS.

The particulars in the prospectus are not binding in detail.

STROJEXPORT

PRAHA - CZECHOSLOVAKIA

Printed in Czechoslovakia

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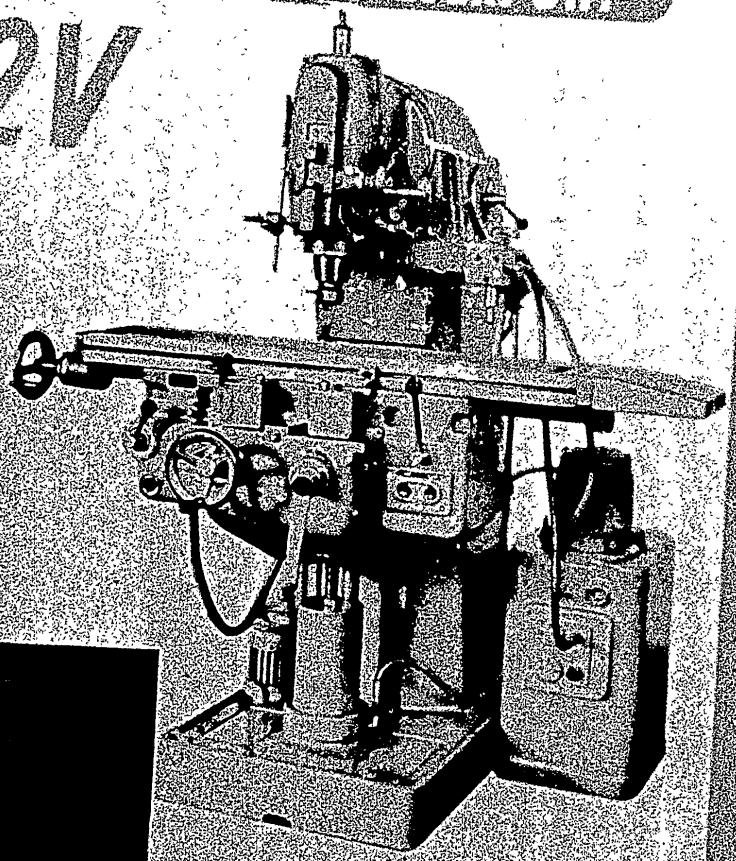
FA 2V



Type FA 2V MILLING MACHINE
WITH COPYING ATTACHMENT

KZA2

The machine is intended for copying work on parts of irregular shapes and is particularly suitable for manufacturing glass, metal patterns, moulds, etc.

The copying attachment has its own oil pump which supplies oil to the distributing slide at a pressure of 12 atm. (170 psi).

The tracer mounted on a land slides along a template or over a pattern and its movements control the admission of oil to the vertical cylinder and thus also the vertical position of the table.

The longitudinal feed of the table is mechanical and its rate can be changed even during operation of the machine. The transverse spacing of lines is automatic and can be varied in a range of 0.125 to 3.75 mm. When the working cycle is completed the machine stops automatically.

The pressure of the tracer against the pattern is only 500 grammes (1.1 lbs) so that a pattern of soft material may be used.

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SPECIFICATIONS

Table: Working surface: width	ins.	9.8
length	ins.	49.2
Number of T-slots		3
Width x distance of T-slots	ins.	0.55 x 2.16
Longitudinal travel: by hand	ins.	37
by power	ins.	31.5
Cross travel: by hand	ins.	11
by power	ins.	10.8
Vertical movement: by hand	ins.	16.1
by power	ins.	13.7
Spindle: Standard taper hole	ISA	44
On demand metric	No.	40
Morse	No.	2
Distance from centerline of spindle to top of table: maximum	ins.	16.7
minimum	ins.	0.6
Distance from spindle nose to inside of arbor support	ins.	19.7
Distance from centerline of arbor to underside of overarm	ins.	5.5
Distance from column to brace	ins.	22.2
Spindle speeds: number		12
standard series	R. p. M.	45—2000
high series	R. p. M.	63—2800
Feeds: Number		13
Range of longitudinal and cross feeds	ins/Min.	9/16—37
Range of vertical feeds	ins/Min.	5/32—10
Power rapid traverse: Longitudinal and cross	ins/Min.	110
Vertical	ins/Min.	31
Drive: Main motor: Speed	R. p. M.	1430
Input	HP	5.7
Feed motor: Speed	R. p. M.	1380
Input	HP	1
Shipping data: Floor space required	ins.	74.5 x 70
Weight of machine with standard equipment	lbs.	3520
with railway packing	lbs.	3850
with seaworthy packing	lbs.	4400
Contents boxed	cu. ft.	194

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operator's instruction booklet.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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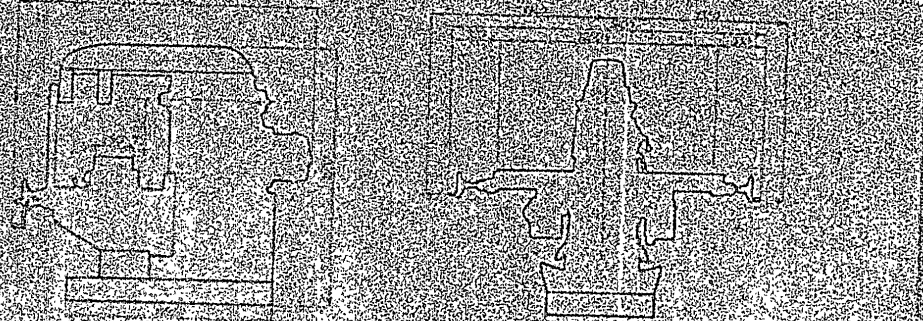

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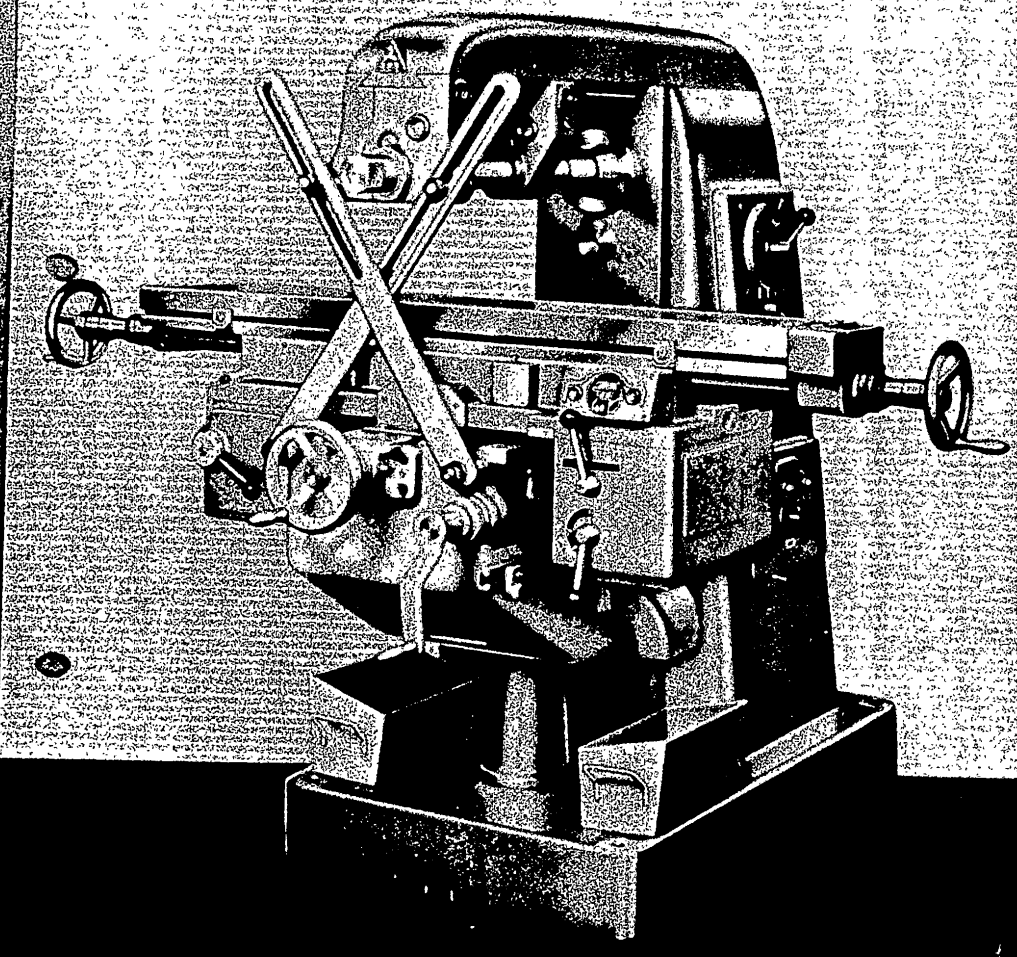
FA3H



PLAIN MILLING MACHINE Model FA3H

TOS

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SPECIFICATION

Working surface of table	750×250 mm		29½"×9¾"
Number of table T slots	3, 14 mm (⅝")		3, ⅝"
Spacing of table T slots		63 mm	2½"
Taper in quill, standard		Morse No. 3	
optional		Morse No. 4	
Distance, centre line of spindle to table, maximum	345 mm		13½"
minimum	20 mm		¾"
Number of spindle speeds		9	
Available ranges of spindle speeds (range to be selected by customer)	range I	67 to 1020 r.p.m.	
	range II	95 to 1430 r.p.m.	
	range III	132 to 2030 r.p.m.	
Longitudinal travel of table, hand/power	435/425 mm		17¼"/16¾"
Cross travel of table, hand	175 mm		6¾"
Vertical travel of table, hand	320 mm		12½"
Number of power feeds		9	
Available ranges of power feeds (range to be selected by customer)	range A	12 to 195 mm per min.	1/2" to 7¾" per min.
	range B	17 to 270 mm per min.	¾" to 10½" per min.
	range C	25 to 375 mm per min.	1" to 14¾" per min.
Motor, power		1.5 to 2.2 HP	
speed		1400 r.p.m.	
Belt pulley, dia.×width	120×60 mm		4¾"×2¾"
Weight of machine with standard equipment	760 kg		1680 lbs.
Shipping weight of machine, seaworthy packing	920 kg		2030 lbs.
Dimensions of packing case	1400×1450×1700 mm		55"×57"×67"
Volume of packing case	2.95 m³		105 cu. ft.

STANDARD EQUIPMENT:

1 simple milling arbor 22 mm dia., 1 clamping screw, cooling equipment with electric motor and piping, 1 reversing switch with wiring and fuses, 1 grease gun, 1 set of spanners, and operating instructions.

Please state in your order the voltage available for the electric motors

Improvements are continuously being made on the machines. The data given in the prospectus are therefore not binding in detail.

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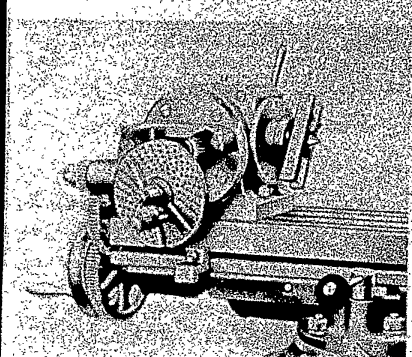
OPTIONAL EQUIPMENT

The following optional equipment is available for the universal milling machine on special order and against extra charge. An electric motor, belt pulley for the electric motor, belt, electric lighting, type DH 10 universal dividing attachment (for this attachment a vertically adjustable tailstock, a cross plate and a support for the milling of long objects can be supplied on special order), a type FD 2 rack milling attachment, a type SR 2 circular table, a type HS 2 vertical milling attachment and a type HU 2 universal milling attachment.



TYPE DH 10 UNIVERSAL DIVIDING ATTACHMENT

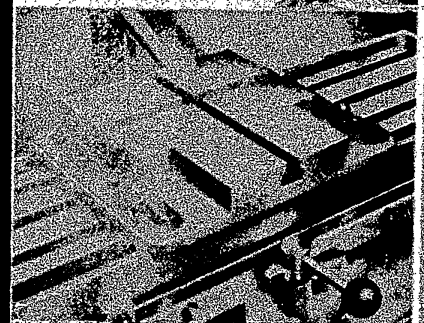
This attachment facilitates direct, indirect and differential dividing into from 2 to 360 divisions.

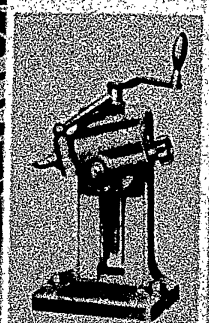
When change gears are used helical slots of all common pitches can be milled on this attachment.

When the attachment is used on a type F 2 U milling machine the distance between centres is 285 mm, the height of the centres being 100 mm.

The dividing attachment can be tilted as much as 10° below its horizontal position and as much as 10° above its vertical position. This enables tapers to be milled. The type DH 10 dividing attachment is supplied with the following standard equipment:

a tailstock, a dividing disc for direct dividing, 3 dividing discs for indirect dividing, a set for change gears, 3 spindlants for change gears, a centre with a driver, an extended centre with a driver, 4 attach-

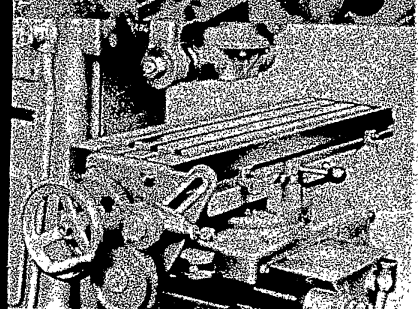




ing screws, a set of spanners and operating instructions with tables.

In addition to the above, the following items are supplied for the attachment on special order and against extra charge:

a vertically adjustable tailstock, a cross plate and a support for milling long objects.

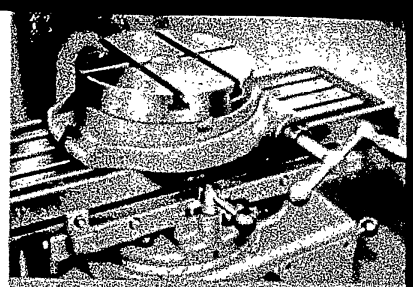


TYPE PD 2 RACK MILLING ATTACHMENT

This attachment is used for the milling of racks, etc. It facilitates dividing into pitches commonly used in the metric as well as in the inch system.

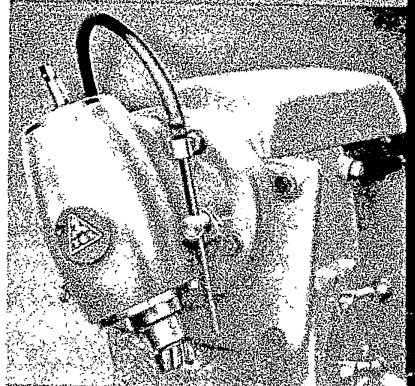
TYPE SR 2 CIRCULAR TABLE

This attachment is intended for circular milling. The diameter of the clamping surface is 250 mm ($9^{13}/_{16}$"). The circular feed is hand operated. The table can be locked in any position by means of a screw.



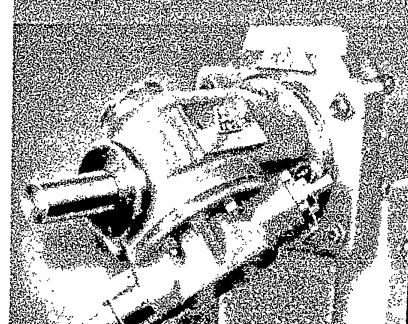
TYPE HS 2 VERTICAL MILLING ATTACHMENT

When this attachment is used various jobs can be done on the type F 2 U machine which would otherwise require a vertical milling machine.



TYPE HU 2 UNIVERSAL MILLING ATTACHMENT

The spindle of this attachment can be set in any direction. The attachment is used chiefly for milling surfaces which are difficult of access in various slanting planes and wherever the axis of the spindle is required to be parallel with the table, e. g. for the milling of racks.



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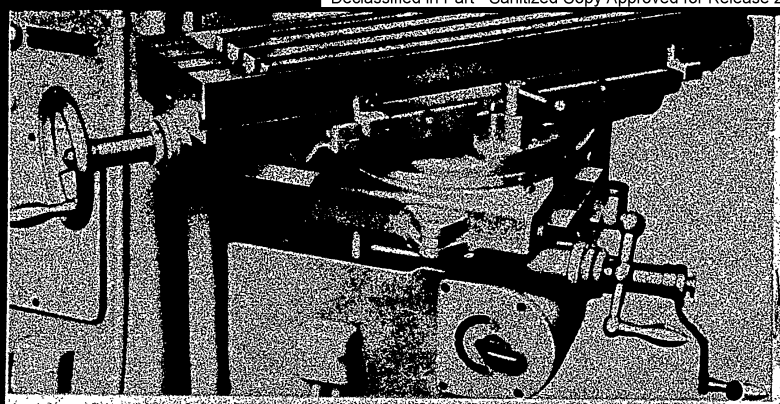


There is a total of 9 rates of feed in each range, the choice of the range is imposed by the customer.

Range A: 12 — 17 — 23 — 32 — 47 — 67 — 95 — 135 — 195 mm per min.
[illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] per min.

Range B: 17 — 23 — 32 — 47 — 67 — 95 — 135 — 195 — 270 mm per min.
[illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] per min.

Range C: 23 — 32 — 47 — 67 — 95 — 135 — 195 — 270 — 375 mm per min.
[illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] — [illegible] per min.

The longitudinal feed is engaged by moving a lever mounted in front of the working table in the direction of the required feed.

The machine is equipped with adjustable stops for automatic disengagement of the power feeds. The working table can be moved by hand vertically, longitudinally and crosswise. The movement is read on indexing rings.

The working table swivels up to 45° in either direction. The angle of swivel can be read on a scale.

The arrangement of the drive for a universal dividing attachment from the feed mechanism of the table permits spirals, cams, etc. to be milled.

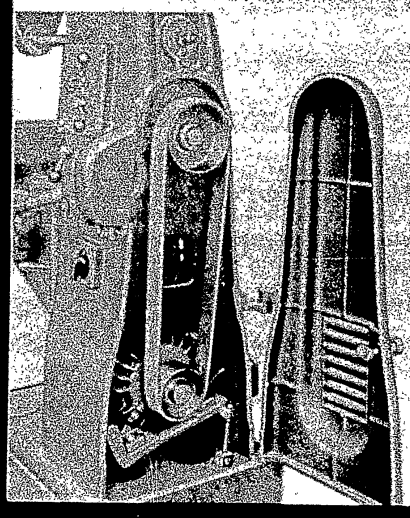
The machine is driven by an electric motor by means of a belt. The motor is mounted on a swivelling plate. This enables easy adjustment of the belt tension.

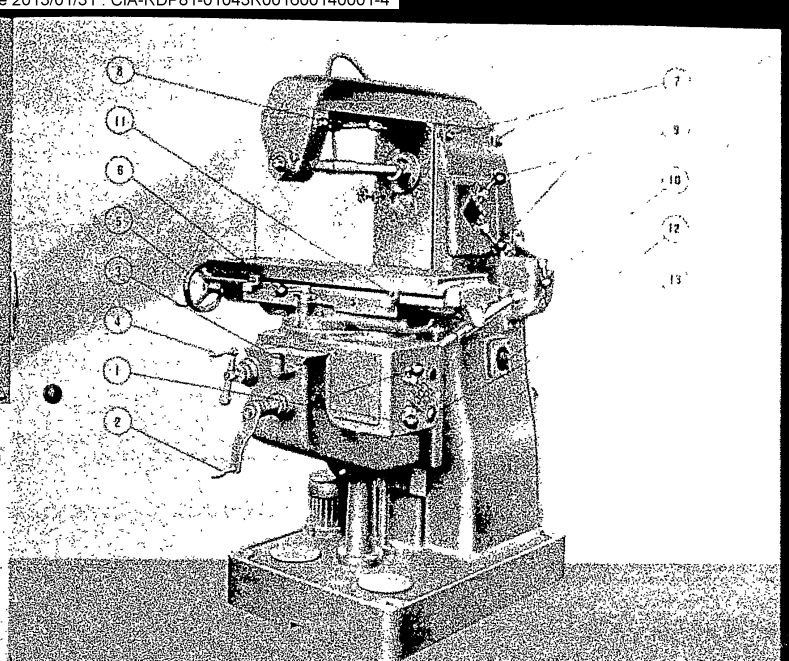
The housing is of ample dimensions and suitably reinforced with ribs.

A well designed lubricating system ensures reliable automatic lubrication of the driving mechanism in the housing. The oil level can be checked on the oil level gauge.

The mechanism of the table and of the knee is lubricated with oil from central lubricators.

The efficient cooling system consists of an electric motor driven pump which supplies coolant from a tank formed in the bottom of the housing through a rubber hose and nozzle to the workpiece.





CONTROLS

1. Levers for changing feeds
2. Crank of vertical feed
3. Oil filling hole
4. Crank of cross feed
5. Hand wheel of longitudinal feed
6. Lever for engagement of longitudinal power feed
7. Locking screws of overarm
8. Lever [illegible]
9. Levers for [illegible]
10. Levers for disengagement of power feed drive
11. Stops for disengagement of longitudinal power feeds
12. Main switch
13. Oil level gauge of lubrication of feed box

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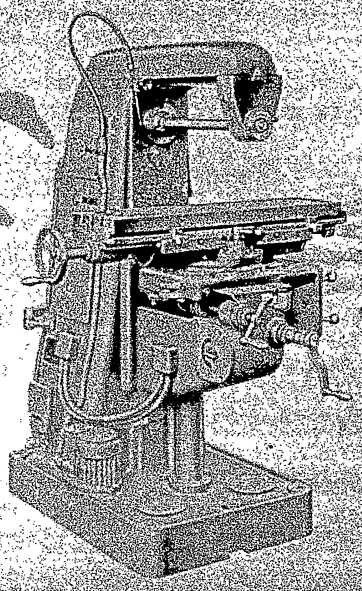
UNIVERSAL MILLING MACHINE TYPE U 21



- This is a machine for all current milling work on small machinery parts.
- It is used for milling jobs in single as well as in series production.
- Precise workmanship and the use of high grade materials ensure permanent precision of work.
- Numerous attachments and accessories supplied as optional equipment increase the versatility of the machine and enable milling work to be carried out which would otherwise require a number of further machines.
- A wide range of spindle speeds and power feeds allow the choice of a suitable cutting speed and depth of cut for the machining of any commonly used material, not only steel, but also non-ferrous and light metals.

OUTSTANDING FEATURES

[illegible] and accuracy.

[illegible] of spindle speeds and feeds in accordance with [illegible] Code.

[illegible] and automatic operation of machine components for any operation.

[illegible] for milling in a vertical plane.

DESCRIPTION

The spindle is made of high grade steel, hardened and finely ground. It runs in precision taper roller bearings the play of which can be finely adjusted. The machine can be ordered with a spindle either with a size 30 steep taper or with a No. 2 Morse taper.

For work which requires clearance of the tool at a distance from the [illegible] frame [illegible] of the milling arbor is carried in a supported bearing which slides along the [illegible] on hardened dimensions on the guideway and a double tail cross section [illegible] the bearing on the overarm can be fixed by means of a screw. The overarm can be pushed backward in case a vertical or universal milling attachment is to be used on the machine.

The spindle speeds are changed by means of two levers at the right hand side of the housing. There is a total of 9 speeds arranged in each range, the choice of range being made by the customer in accordance with the intended kind of milling work.

Range I: 67 — 95 — 132 — 190 — 270 — 380 — 515 — 740 — 1020 r. p. m.

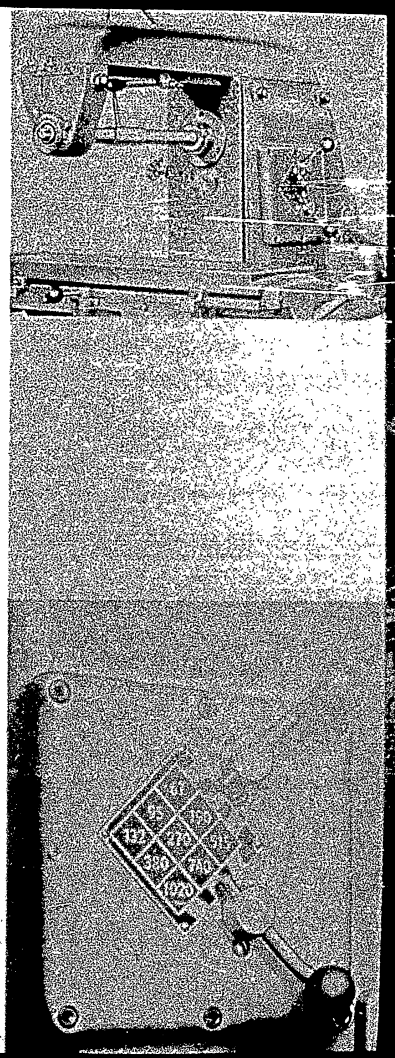
Range II: 95 — 135 — 190 — 268 — 385 — 530 — 730 — 1050 — 1450 r. p. m.

Range III: 132 — 190 — 265 — 380 — 510 — 730 — 1030 — 1480 — 2050 r. p. m.

The spindle can rotate in either direction. The rotation is reversed by means of the motor reversing switch fitted at the left hand side of the knee.

The working table is equipped with longitudinal power feeds. These are driven off the main shaft in the housing by means of a universal joint shaft at the right hand side of the machine.

The feeds are changed by means of two levers on the gear box at the right hand side of the knee.



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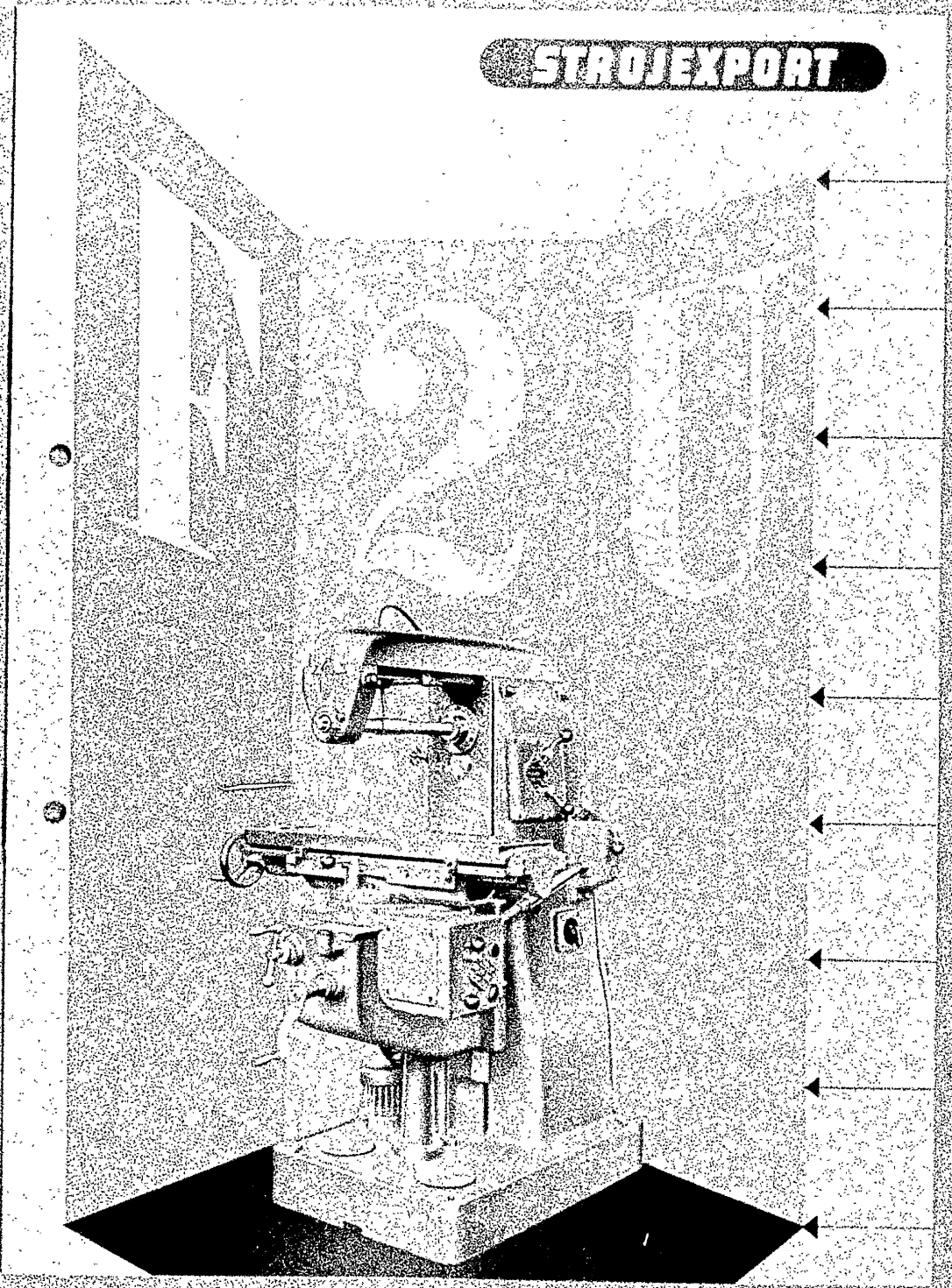

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SPECIFICATIONS

Table: Working surface, width	mm	250
length	mm	1250
Number of T-slots		3
Width x distance of T-slots	mm	14 x 55
Longitudinal travel: by hand	mm	810
by power	mm	800
Cross travel: by hand	mm	235
by power	mm	225
Vertical movement: by hand	mm	340
by power	mm	350
Table swivel in both directions		45°
Spindle: Standard taper hole	ISA	24
Oa demand metric	No.	40
Morse	No.	4
Distance from centerline of spindle to top of table: maximum	mm	375
minimum	mm	15
Distance from spindle nose to inside of arbor support	mm	500
Distance from centerline of arbor to underside of overarm	mm	140
Distance from column to brace	mm	565
Spindle speeds: number		12
standard series	R.p.M.	45—2000
high series	R.p.M.	63—2800
Feeds: Number		13
Range of longitudinal and cross feeds	mm/min	14—900
Range of vertical feeds	mm/min	4—250
Power rapid traverse: Longitudinal and cross	mm/min	2800
Vertical	mm/min	800
Drive: Main motor: Speed	R.p.M.	1430
Input	HP	5.7
Feed motor: Speed	R.p.M.	1380
Input	HP	1
Shipping data: Floor space required	mm	1900 x 1760
Weight of machine with standard equipment	kg	1550
with railway packing	kg	1800
with sea-worthy packing	kg	2050
Contents: boxed	m³	5.5

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operator's instruction booklet.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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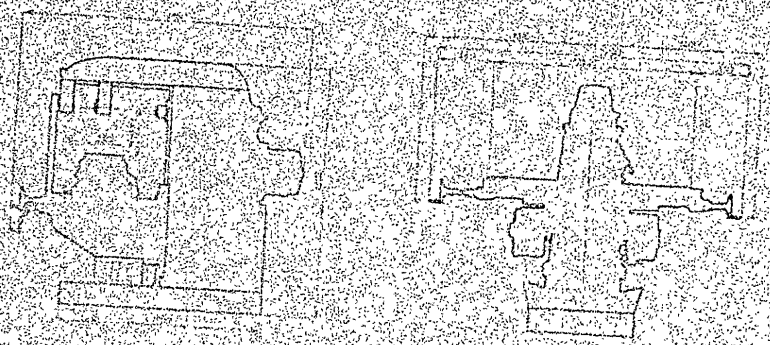

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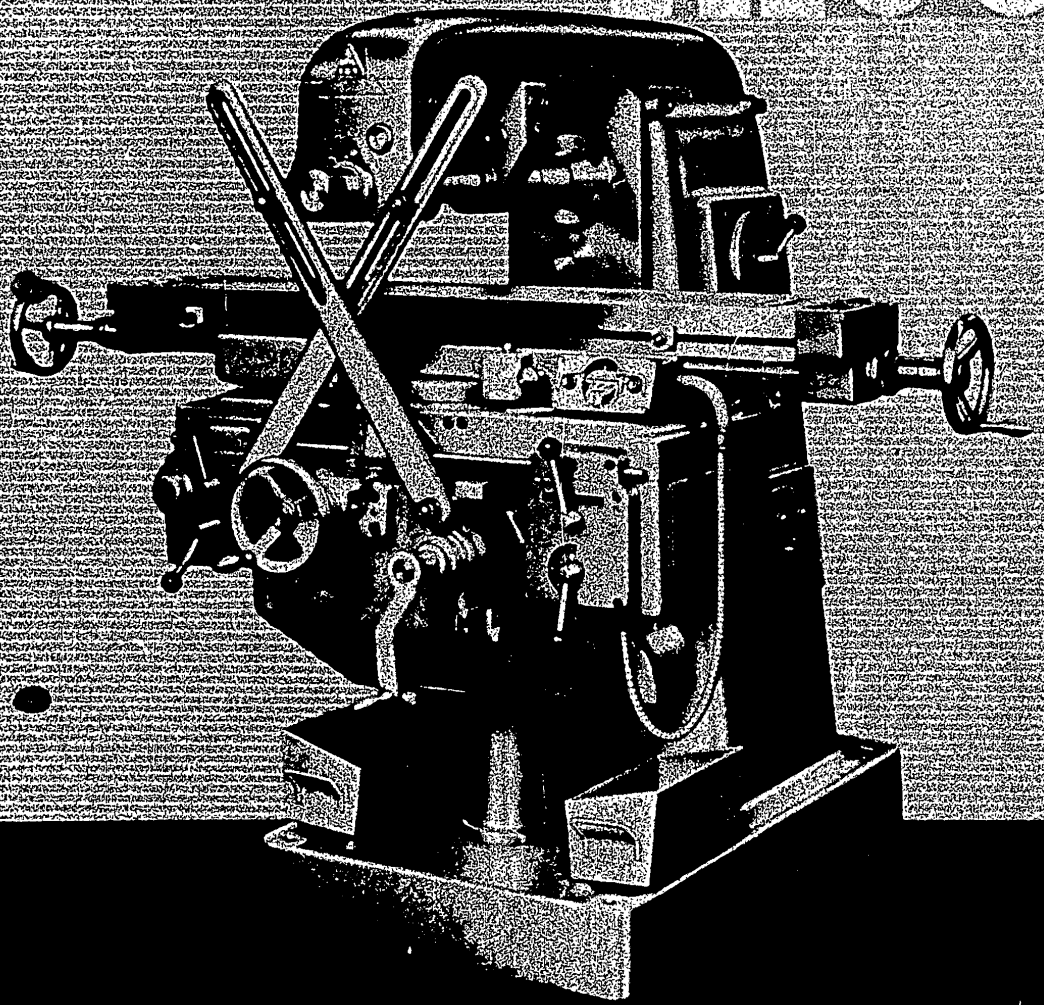
FA3U



UNIVERSAL MILLING MACHINE Model FA3U

TOS

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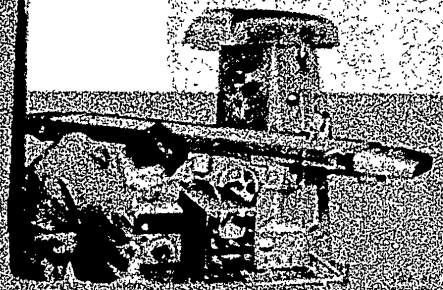
Specifications

		FA 315	FA 415	FA 515
Working surface of table, width	mm	425	425	500
length	mm	2000	2000	2000
Tenons, number		3	3	3
width	mm	20	20	20
		0.79"	0.79"	0.79"
distance between T-slots	mm	90	90	90
		3.54"	3.54"	3.54"
Longitudinal travel of table, by hand	mm	1410	1410	1500
		55 1/2"	55 1/2"	59 1/2"
by power	mm	1400	1400	1250
		55"	55"	49 1/4"
Cross travel of table, by hand	mm	435	450	510
		17 1/4"	17 3/4"	20 1/8"
by power	mm	440	440	400
		17 1/4"	17 1/4"	15 3/4"
Cross travel when using bracket, by hand	mm	320	320	390
		12 5/8"	12 5/8"	15 1/8"
by power	mm	400	400	360
		15"	15"	13"
Vertical travel of table, by hand	mm	460	460	410
		18 1/8"	18 1/8"	16 1/8"
by power	mm	450	450	400
		17 3/4"	17 3/4"	15 3/4"
Table inserts, number		1	1	1
Taper of table inserts		1:50	1:50	1:50
	degree	1° 30'	1° 30'	1° 30'
		1	1	1
Distance between axis of spindle and table, max.	mm	328	328	354
		12 7/8"	12 7/8"	13 7/8"
minimum	mm	65	65	40
		2 1/2"	2 1/2"	1 5/8"
Distance between axis of spindle and column, max.	mm		260/320	260/320
With centre sleeve removed (Lamello)	mm			
Distance between axis of spindle and front edge of table	mm	520	520	520
		20 1/2"	20 1/2"	20 1/2"
Distance between axis of spindle and surface of column	mm	180	180	180
Distance between axis of spindle and rear edge of table	mm		170	170
Spindle head swivel, to either side, from 0° to	degree		45°	45°
Vertical adjustment of spindle	mm		170	170
			6 3/4"	6 3/4"
Spindle speeds, number		8	8	8
standard range	r.p.m.	1000—6000	1000—6000	1000—6000
Feeds, number		16	16	16
for routing and cross-boring ranges from	mm/min	10—1250	10—1250	10—1250
		0.4"—49 1/2"	0.4"—49 1/2"	0.4"—49 1/2"
for all feeds ranging from	mm/min	3.5—111	3.5—111	3.5—111
		0.14"—4 3/8"	0.14"—4 3/8"	0.14"—4 3/8"
Rapid traverse of longitudinal guide	mm/min	1200	1200	1200
		47 1/4"	47 1/4"	47 1/4"
Rapid traverse of cross guide	mm/min	800	800	800
		31 1/2"	31 1/2"	31 1/2"
Motor for spindle drive, power	kW	4	4	4
	h.p.	5.5	5.5	5.5
On special order, power	kW	5.5	5.5	5.5
	h.p.	7.5	7.5	7.5
Feed motor, power	kW	0.18	0.18	0.18
	h.p.	0.25	0.25	0.25
Floor space required	mm	1970 x 2310	1970 x 2310	1970 x 2310
		78" x 91"	78" x 91"	78" x 91"
Height of machine	mm	1440	1440	1440
		56"	56"	56"
Weight of machine, with standard equipment	kg	1500	1700	1700
		approx. 3,300 lbs	approx. 3,700 lbs	approx. 3,700 lbs
with packing	kg	1600	1800	1800
		approx. 3,500 lbs	approx. 3,900 lbs	approx. 3,900 lbs
with export packing	kg	approx. 3,700 lbs	approx. 4,000 lbs	approx. 4,000 lbs
Discount band		III	III	III

Standard equipment: fixing arbor, multi-purpose tool, cooling attachment, electrical equipment, spanner for adjusting spindle, instruction book.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

All improvements in design are continually being made, this specification is subject to change or revision without notice.



STROJEXPORT

PRAHA · CZECHOSLOVAKIA

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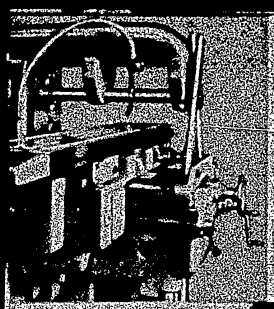


OPTIONAL EQUIPMENT

AUTOMATIC FEED CYCLE ATTACHMENT

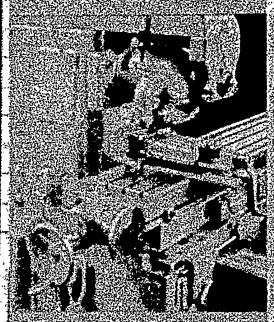
The Horizontal and Vertical Millers can be equipped with an automatic feed cycle attachment which simplifies the operation and thus increases the production rate of the machine in the duplicate and mass production. The electrically controlled automatic working cycle can consist of several rapid advances and working feeds both in the right and left longitudinal direction and of rapid return.

UNIVERSAL DIVIDING HEAD MODEL DUA S

enables the direct, indirect and differential indexing as well as the milling of spirals and cams by power feed. Indexing range: 2—400 divisions. Range of pitch of the spiral: 20—6000 mm p. r. evolution of the dividing head spindle.
Standard equipment: Tailstock, indexing plates, set of change gears, change gear quadrant, centers with carrier, set of wrenches, operating instructions and plates.
Optional equipment: Tailstock, adjustable for height, right angle plate, steady rest for milling long work, gear quadrant for milling fine pitch threads.

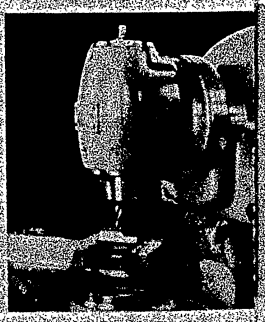
RACK INDEXING ATTACHMENT MODEL PDA S

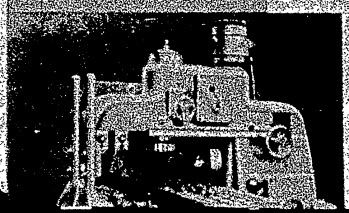
is used in connection with universal milling heads as an auxiliary device for milling racks.



VERTICAL MILLING HEAD MODEL HVA S

The Vertical Milling Head, the spindle of which can be set at any angle in the vertical plane, enables a variety of milling operations on horizontal and universal millers where otherwise vertical milling machines would be necessary.



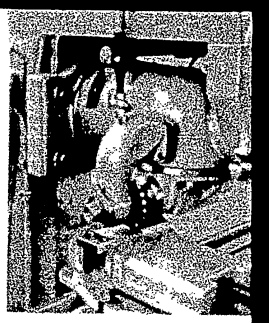


OVERARM WITH VERTICAL SPINDLE MODEL FRA S

The Vertical Spindle is driven from a self-contained electric motor through a gear box giving 8 spindle speeds. It is mounted in a sleeve and adjustable for height. Its starting is effected by a switch, either simultaneously with the main spindle, or individually. Automatic lubrication for the headstock mechanism is provided. The work may be machined both vertically and horizontally at the same time.
On request and at extra cost we supply this attachment with high series of spindle speeds ranging from 80—2000 R. p. M. This attachment should be ordered simultaneously with the machine.

UNIVERSAL MILLING HEAD MODEL HUA S

The spindle of the Universal Milling Head can be swivelled in any position. The head is designed for milling surfaces which are not easily accessible, such as bevel surfaces, and for jobs where the centerline of the spindle must be parallel with the longitudinal table feed, for example in rack cutting.

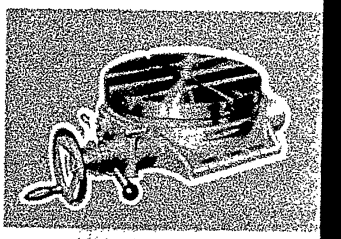


CIRCULAR MILLING ATTACHMENT MODEL SMA S

Circular Milling Attachment is arranged for hand as well as power circular feed both clockwise and counterclockwise. The table is fed by 4° per one revolution of the handwheel. The dial on the indexing ring enables the indexing with an accuracy of 5'.

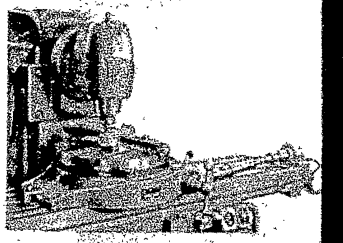
CIRCULAR MILLING ATTACHMENT MODEL SMA S

Circular Milling Attachment is arranged for hand feed only. It is equipped with a trip worm and an indexing plate for 24 numbers. The table is fed by 4° per one revolution of the handwheel. A vernier, provided on the table enables angular setting with an accuracy of 5'.



SLOTTING ATTACHMENT MODEL HOA S

This attachment enables a variety of slotting operations on Horizontal and Universal Millers, where otherwise a Slotting Machine would be necessary.



GEAR HOBBING ATTACHMENT MODEL OPA S

This attachment is used for generating gears by the hobbing method. It will cut spur gears with straight teeth and spur gears with helical teeth up to the angle of 30 deg. and module 6, dia. of gear 395 mm and maximum face of gear 250 mm. As optional equipment to the attachment can be ordered: gear box for the production of worm wheels up to the maximum module 6, by the radial or tangential feed; clamping plate for gripping large diameter gears; hob arbors dia. 22 or 32 mm.
In addition to the above mentioned attachments we can supply precision machine vices of the tilting and swivel type, clamping arbors of different dimensions and length, collets, reducing sleeves and other attachments as per special catalogue.

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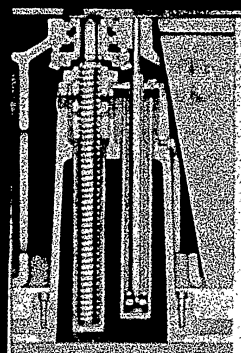


TABLE

The working table travels in the long guides of the cross slide which moves on the broad knee surfaces. For increased rigidity the knee is reinforced by two cylindrical supports on which it is locked in position after having been adjusted for height, so that it forms an integral unit with the column and base plate. On the universal machines the working table with the upper part of the cross slide swivel 45° in either direction and can be secured in the required position by four bolts which are accessible from the front of the table. The play in the knee, cross slide and table guideways is eliminated by adjusting the guide gibs.

LUBRICATION

The spindle drive and speed change mechanisms are oiler by an individually motor driven gear pump the function of which may be watched in a sight window on the right-hand side of the column. On the vertical machines all bevel driving gears and all spindle bearings are oiled automatically.

Gears, bearings and other parts of the feed box have circulation system lubrication by an individual plunger pump, which after depressing the distributor by hand forces the oil simultaneously to all bearings of the feed drive mechanism of the table and to all guideways on the knee and cross slide. For the knee guides on the column and the bearings of the longitudinal screw spindle centralised lubrication from oiling stations is provided.

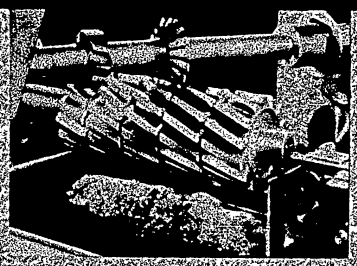
On all types the lubrication and cooling of the vertical screw spindle is in an oil bath and when engaging the vertical feed or the rapid traverse also by the automatic circulation system of lubrication.

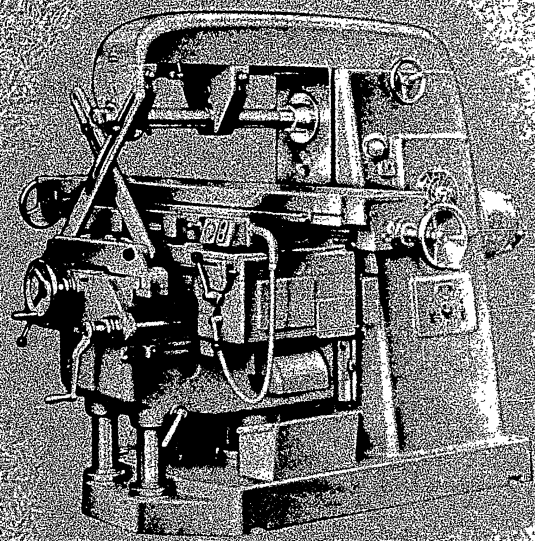
COOLING

For cooling the cutter and work an electric pump is provided on the left-hand side of the column, which supplies the coolant from a tank inside the base plate. The used coolant with chips is drained through broad channels on the sides of the table and trays into the oil pockets on both sides of the knee. In these pockets it is filtered and flows through several cleaners back into the tank.

ELECTRICAL EQUIPMENT

The spindle drive motor, as well as the feed motors are controlled by contactors and protected against overload by thermal relays and fuses. In addition to these two motors the machines are equipped with an individual coolant pump motor and oil pump motor, eventually with a motor for the automatic spindle speed change. The electrical equipment includes also a rectifier for braking the spindle motor by D. C. Auxiliary devices are housed in the lower part of the column.





UNIVERSAL MILLING MACHINE MODEL

FA5U

ZBROJOVKA

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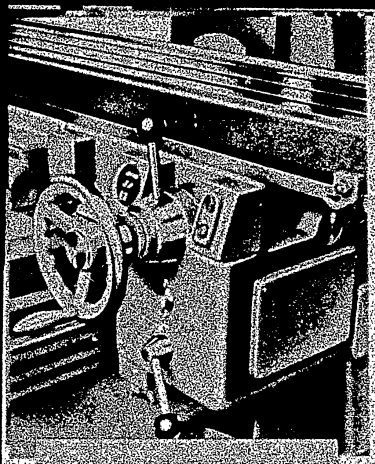
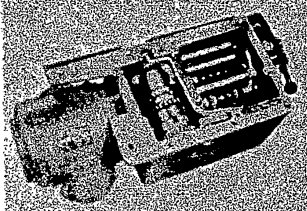
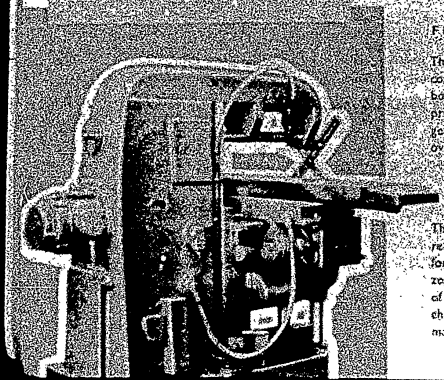






FEED RANGE

The machines have power feeds in longitudinal, cross and vertical directions.
The feed can be changed in the longitudinal and cross directions in the following steps: mm/min. 10, 14, 20, 28, 40, 56, 80, 112, 160, 224, 315, 450, 630, 900, 1250.
The vertical feeds are 1/3 of the longitudinal and cross feeds.

POWER RAPID TRAVERSE

Arranged on all types in all three directions. A multi-plate clutch of new design incorporated in the transmission mechanism enables easy engaging as well as instant and accurate changing of rapid traverses to the working feeds.

FEED CHANGES

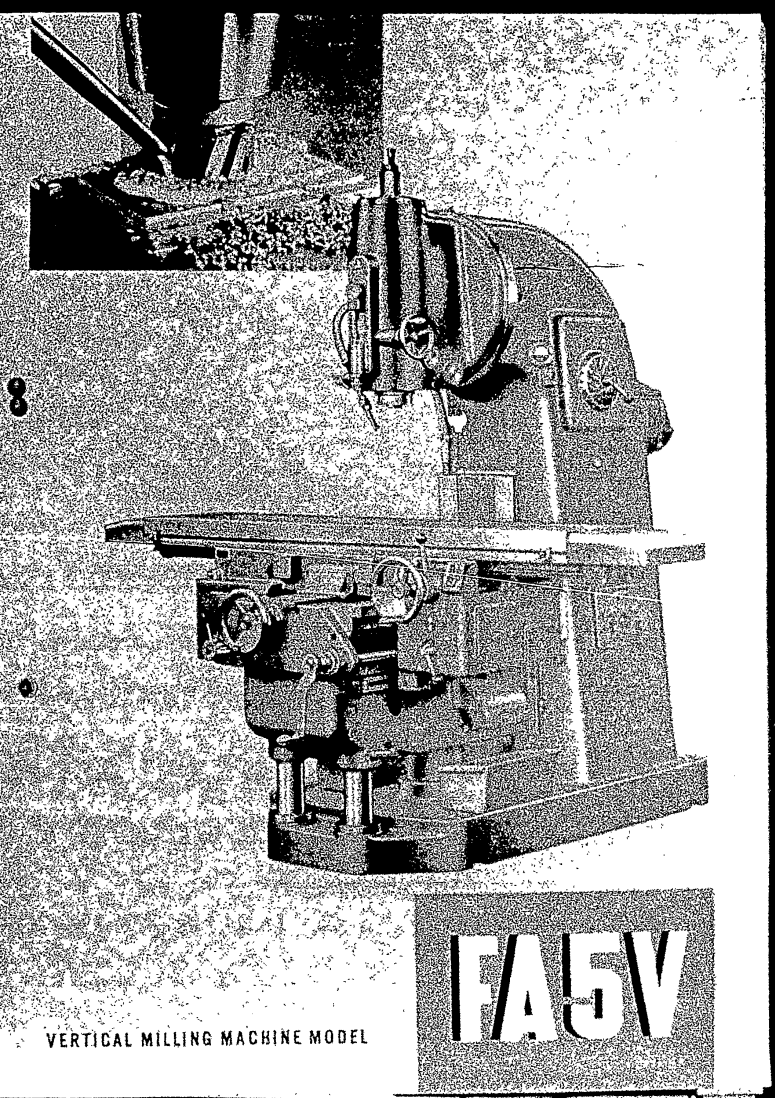
Engaging of power feeds and rapid traverse as well as their changing to each other, and reversing is accomplished by the main control lever on the right-hand side of the cross slide. Their direction (horizontal, vertical and cross) is set by another lower positioned lever and checked by two illuminated arrows of the control device located at the left of the main control lever.
The feed rates are changed by a single lever at the front left-hand side of the machine. The feed changing is facilitated by an auxiliary jog-button device.
Power feeds and rapid traverse in any direction may be disengaged by adjustable stops which instantly stop the feed motor by means of electric cut-off switches. This way of disengaging is more accurate than the mechanical one.

FEED DRIVE

The drive to the feeds and rapid traverse is by a self-contained flanged motor mounted on the rear of the feed box located at the left of the saddle. A thermal relay protects the feed motor against overload. The transmission gears of the apron box and table are protected against overload by 2 safety couplings.

DUAL CONTROL

The Horizontal and Universal Millers are provided at the rear of the saddle with duplicate main control lever, lever for engaging and reversing the table feed and on the Horizontal Millers with handwheel for the longitudinal motion of the table. Apart from this also the table feeds may be changed from this side. Thus it is possible to control the machine also from the operating position at the column.



FA5V

VERTICAL MILLING MACHINE MODEL

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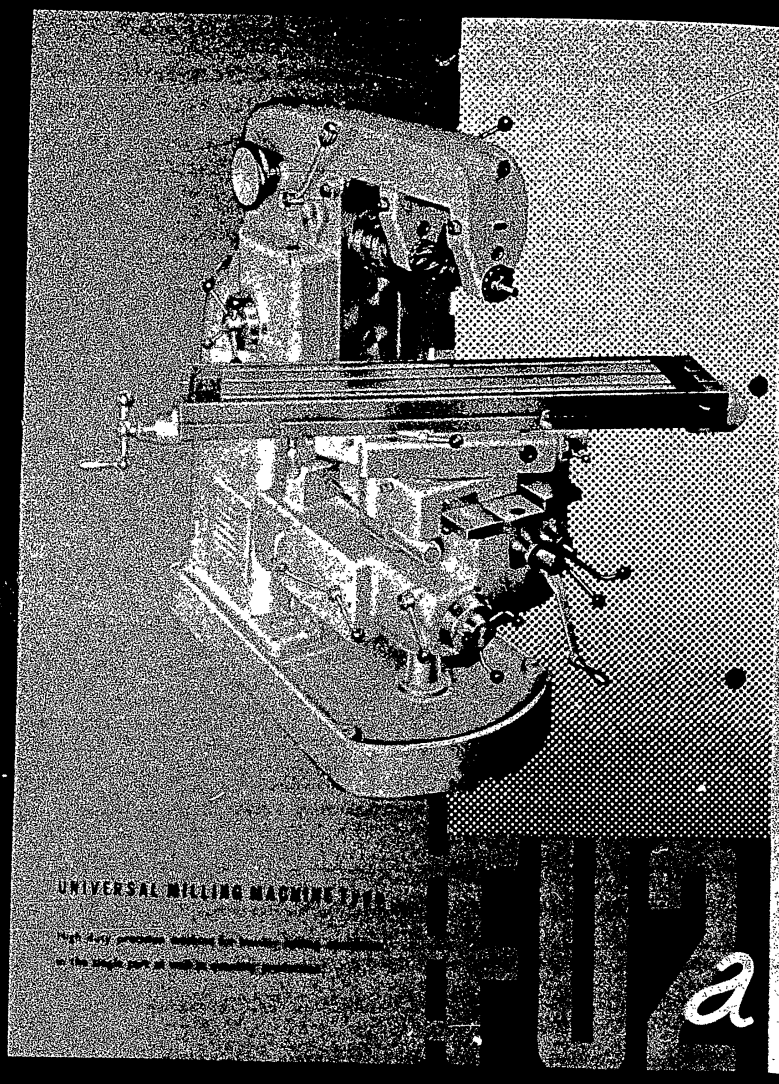

UNIVERSAL MILLING MACHINE FA 3

[redacted]

STROJEXPORT

- Use of the most convenient, carefully inspected, heat-treated structural materials.
- Absolute interchangeability of all components.
- Controlling of motor by a pushbutton on the handle of the starting lever — Signalling the motor run by a bulb on the same handle.
- 16 spindle speeds changed by a single cross lever.
- Wide range of spindle speeds, which are suitable for various kinds of both the cutter and the workpiece materials.
- Supplying the machine arranged for the standard or for the low spindle speed range.
- 2×12 power feeds independent of the spindle rotation, changed by a single cross lever.
- Longitudinal, cross and vertical power feeds as well as rapid traverse.
- Reducing the set feed rate to the half by merely shifting the lever on the feed box.
- Swivelling table (up to 45 degrees in other direction).
- Automatic central lubrication of the gearbox.
- Automatic central lubrication of the knee and the feed box.
- Central pressure lubrication of all points of the cross slide at the same time by merely depressing a single lever.
- Safe and easily accessible electrical equipment.
- Numerous accessories greatly contribute to the versatility of the machine.

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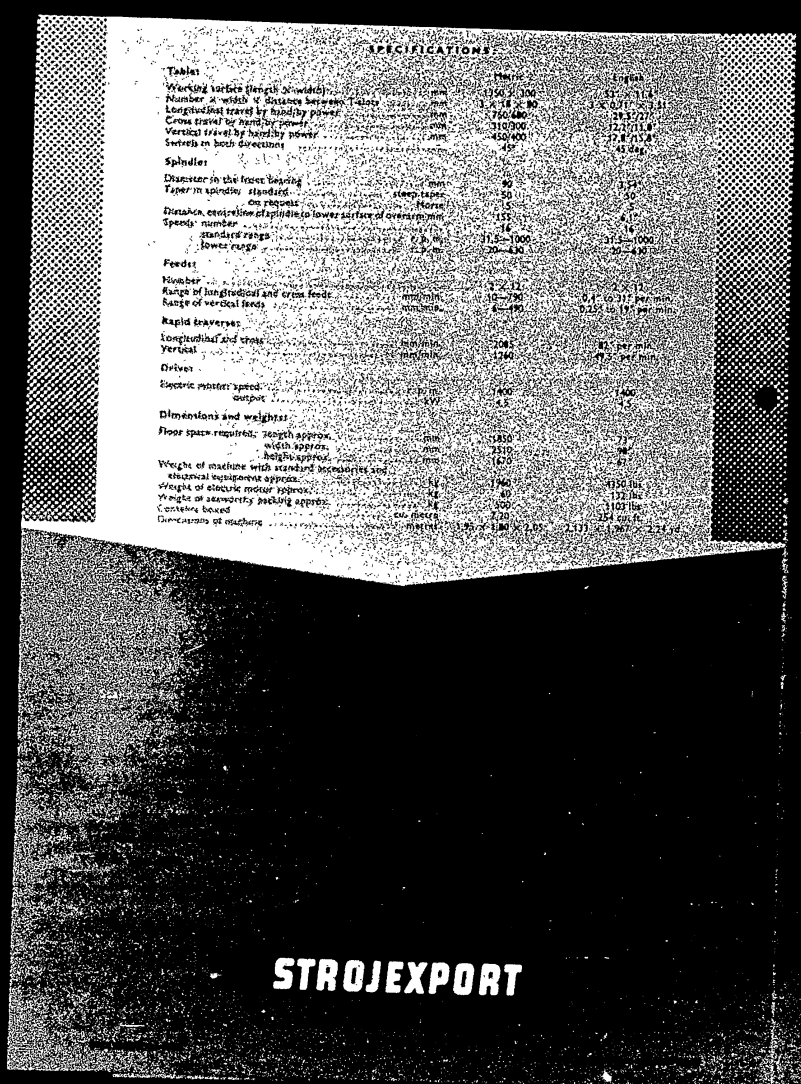

SPECIFICATIONS

		Metric	English
Table:			
Working surface (length × width)	mm	1350 × 300	53" × 11.6"
Number × width × distance between T-slots	mm	3 × 18 × 80	3 × 0.71" × 3.15"
Longitudinal travel by hand/by power	mm	750/680	29.5"/27"
Cross travel by hand/by power	mm	310/300	12.2"/11.8"
Vertical travel by hand/by power	mm	450/400	17.8"/15.8"
Swivels in both directions		45°	45 deg.
Spindle:			
Diameter in the front bearing	mm	90	3.54"
Taper in spindle: standard	steep taper	50	50
on request	Morse	5	5
Distance, centreline of spindle to lower surface of overarm	mm	155	6.1"
Speeds: number		16	16
standard range	r.p.m.	31.5—1000	31.5—1000
lower range	r.p.m.	20—630	20—630
Feeds:			
Number		2 × 12	2 × 12
Range of longitudinal and cross feeds	mm/min.	10—790	0.4" to 31" per min.
Range of vertical feeds	mm/min.	6—490	0.25" to 19" per min.
Rapid traverses:			
Longitudinal and cross	mm/min.	2085	82" per min.
Vertical	mm/min.	1260	49.5" per min.
Drives:			
Electric motor: speed	r.p.m.	1400	1400
output	kW	4.5	4.5
Dimensions and weights:			
Floor space required: length approx.	mm	1850	73"
width approx.	mm	2510	98"
height approx.	mm	1670	67"
Weight of machine with standard accessories and electrical equipment approx.	kg	1960	4350 lbs
Weight of electric motor approx.	kg	60	132 lbs
Weight of seaworthy packing approx.	kg	500	1103 lbs
Container boxed	cu. metre	7.20	254 cu. ft.
Dimensions of machine	metres	1.95 × 1.80 × 2.05	2.133 × 1.967 × 2.24 yd

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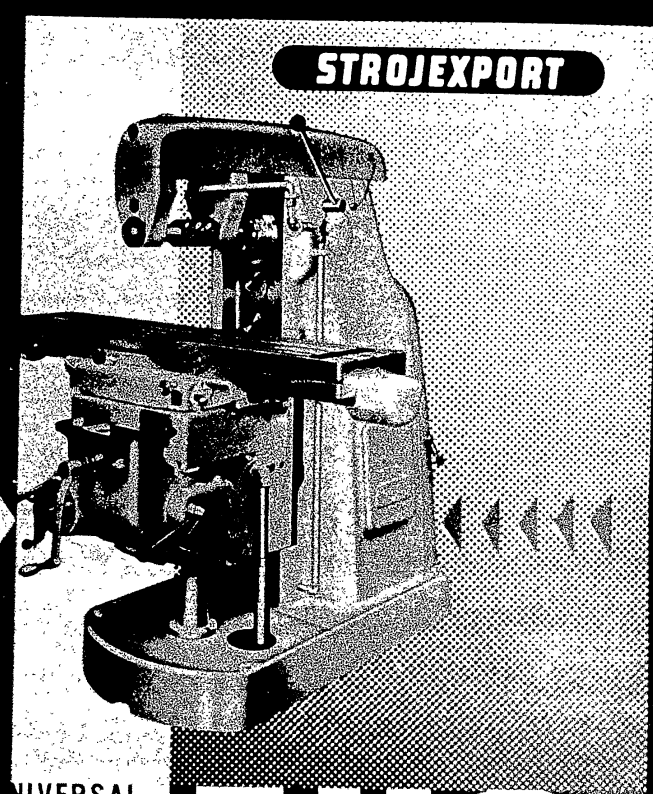

NIVERSAL
MILLING
CHINE Type

TOS

FU2a

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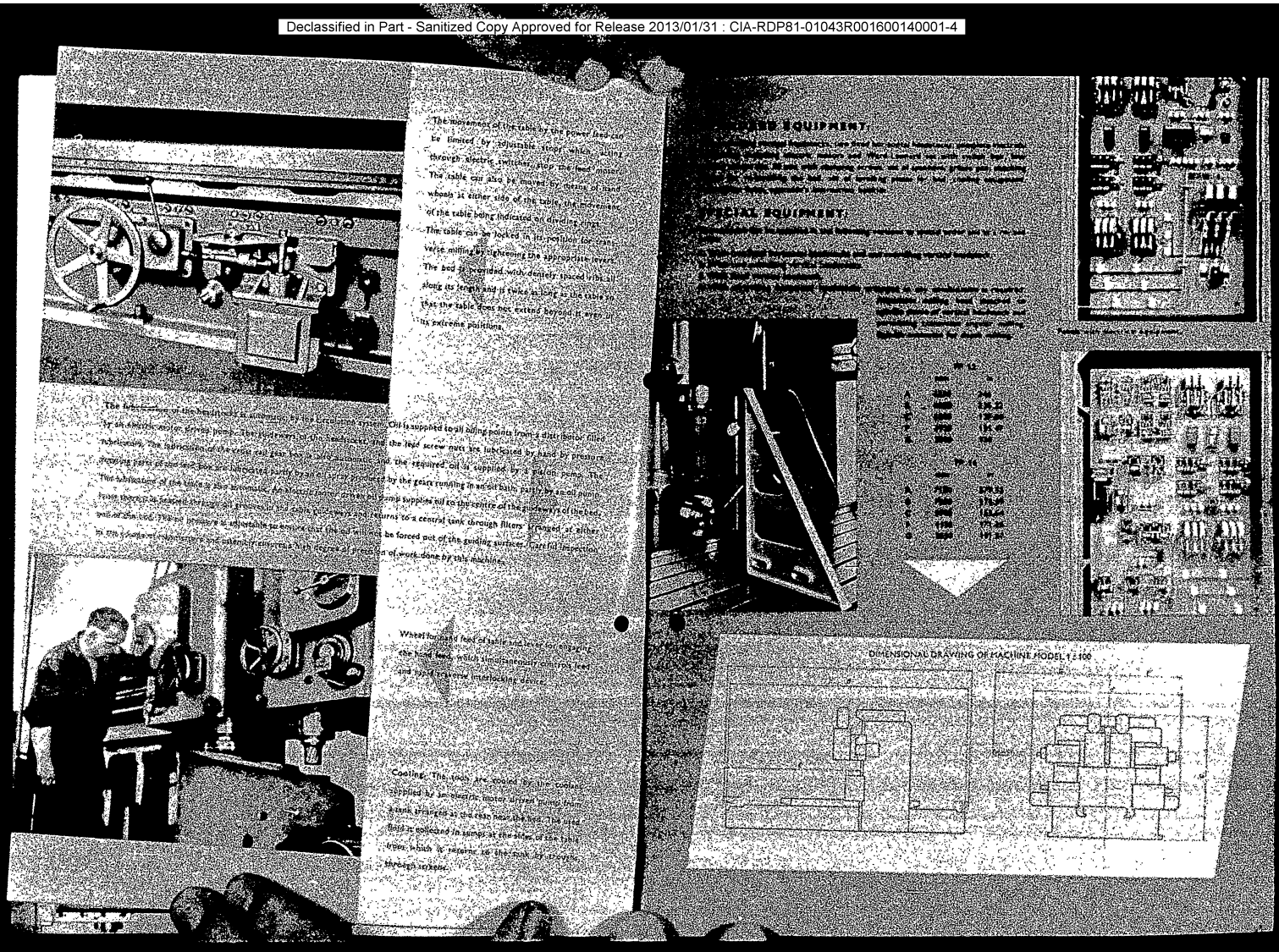

DIMENSIONAL DRAWING OF MACHINE MODEL 1:100

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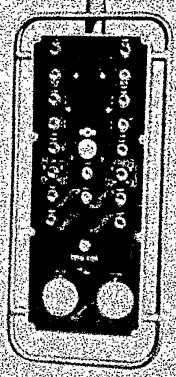
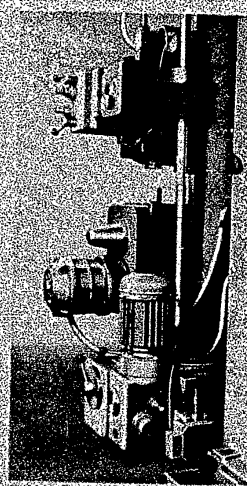


The headstock feeds are mechanical as well as manual. The headstocks can be moved by hand from the right-hand and left-hand side of the machine. The settings are indicated on a scale or, more accurately, on dividing rings. Apart from that the vertical headstocks can be moved by hand by means of a hand lever sliding along the lead screws close to the headstocks.

The following 8 ranges of power feeds are available:

20	31.5	50	80	125	200	315	500 mm per min.
3/4"	1 1/4"	2"	3 1/8"	5"	8"	12 1/2"	20" per min.

The spindle heads can also be moved by rapid traverse of 1000 mm per minute (3 3/8" per min.). The feeds can be controlled from the right as well as left-hand side of the machine.

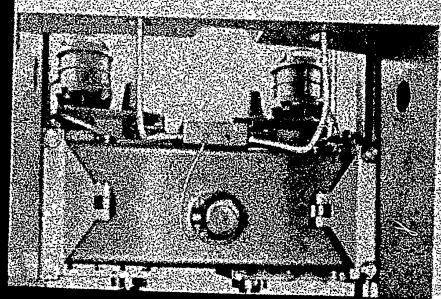


The feeds and the rapid traverse are engaged and disengaged by push buttons on the portable suspended panel. The selection of directions of feed and rapid traverse is controlled by levers on the cross rail or on the boxes at the bottom of the housings.

The feed mechanism is protected by a safety clutch against sudden over-loads or for the [illegible] obstacle. The extreme positions of the headstocks are secured by limit switches.

The horizontal headstocks are balanced by counterweights arranged inside the housings. The headstocks can be clamped to the guideways of the housings in their set position.

The cross rail carrying the vertical headstocks is vertically adjustable by a 1000 mm per minute [illegible] power rapid traverse. This movement is controlled by push buttons on the portable panel. The cross rail is clamped automatically to the guideways in its set position by means of a motor driven clamping arrangement. A multi-plate safety clutch protects the lifting mechanism against damage by sudden over-load or when striking an obstacle. The extreme positions of the cross rail are secured by limit switches.



Rear view of cross rail.

The table has the guideways with adjustable gibs for eliminating the play.

The table feeds are transmitted by a worm engaging with the rack of the table. This arrangement ensures a smooth, uniform movement without vibrations and is self-locking.

The feed mechanism is driven by an electric motor fed by a Ward-Leonard set. The rate of table feed is infinitely variable within a range of 25 to 750 mm per min. (1 to 30" per min.) by two push buttons on the portable panel.

The selected rate of feed within a certain range is indicated by dials on the portable panel.

The table can be moved rapidly in either direction by a 4000 mm per min. (13 feet per min.) rapid traverse. The feeds and the rapid traverse are started and stopped by push buttons on the portable panel.

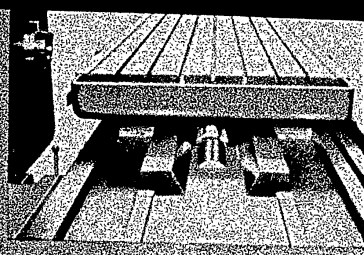


Table in rear extreme position.

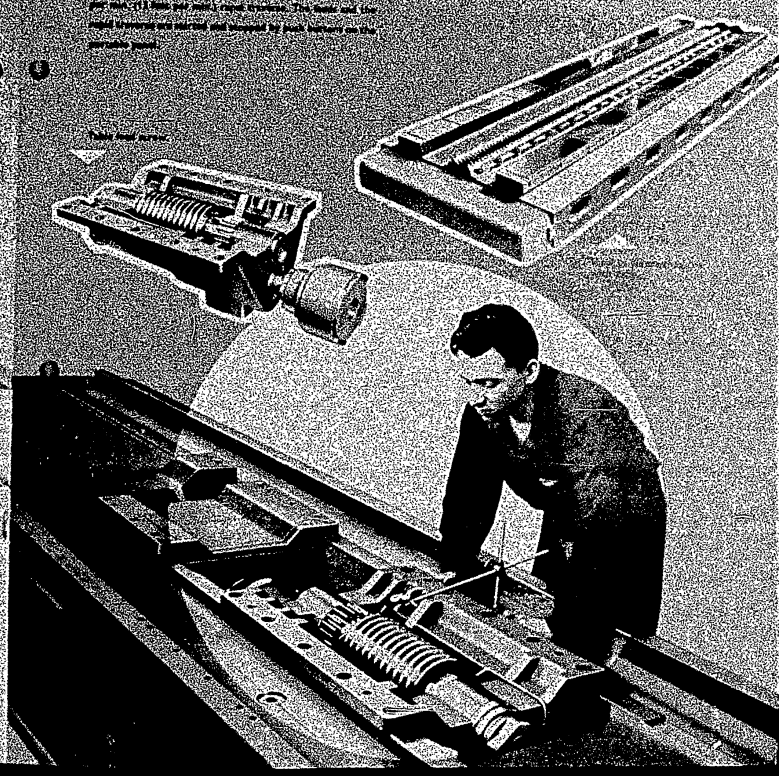


Table feed screw.

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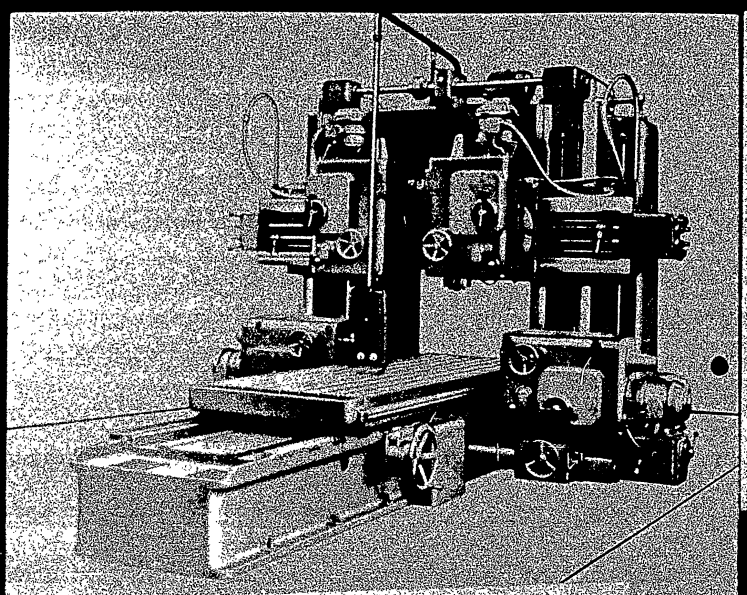
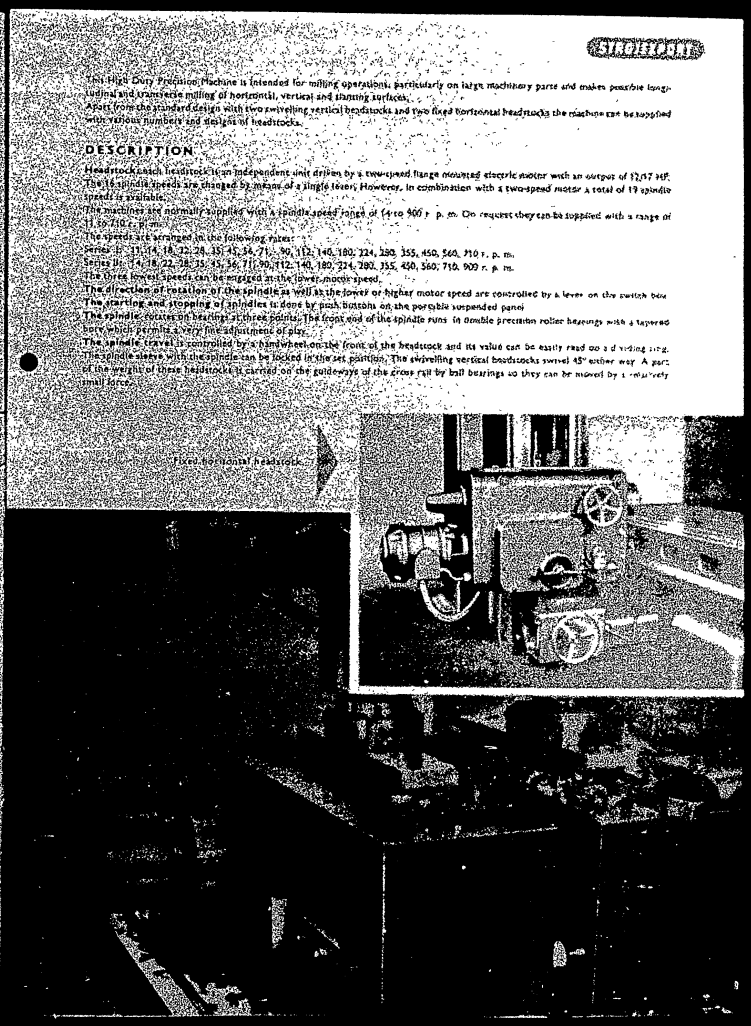


Outstanding features

- Particularly rigid design of housings, cross rail and table.
- Wide range of spindle speeds allowing operation with high-speed steel tools as well as with cemented carbide tipped tools.
- Infinitely variable adjustment of table feeds.
- Particularly quick table travel.
- Independent drives of individual headstocks as well as of table and headstock feeds.
- Central control of various elements of machine concentrated on operator's panel.
- Simple operation from right hand as well as left hand side of machine.
- Automatic clamping of cross rail to guideways of housings in set position.
- Possibility of movement of vertical spindle heads also by means of hand lever sliding along lead screw.
- Relieved movement of vertical headstocks. Substantial part of their weight is carried by ball bearings.
- Independent lubrication of driving mechanism.



This High Duty Precision Machine is intended for milling operations particularly on large machinery parts and makes possible longitudinal and transverse milling of horizontal, vertical and slanting surfaces.

Apart from the standard design with two swivelling vertical headstocks and two fixed horizontal headstocks the machine can be supplied with various numbers and designs of headstocks.

DESCRIPTION

Headstock Each headstock is an independent unit driven by a two-speed flange mounted electric motor with an output of 12/17 HP. The 16 spindle speeds are changed by means of a single lever. However, in combination with a two-speed motor a total of 19 spindle speeds is available.

The machines are normally supplied with a spindle speed range of 14 to 900 r. p. m. On request they can be supplied with a range of 11 to 710 r. p. m.

The speeds are arranged in the following rates:

Series I: 11, 14, 18, 22, 28, 35, 45, 56, 71, 90, 112, 140, 180, 224, 280, 355, 450, 560, 710 r. p. m.

Series II: 14, 18, 22, 28, 35, 45, 56, 71, 90, 112, 140, 180, 224, 280, 355, 450, 560, 710, 900 r. p. m.

The three lowest speeds can be engaged at the lower motor speed.

The direction of rotation of the spindle as well as the lower or higher motor speed are controlled by a lever on the switch box.

The starting and stopping of spindles is done by push buttons on the portable suspended panel.

The spindle rotates on bearings at three points. The front end of the spindle runs in double precision roller bearings with a tapered bore which permits a very fine adjustment of play.

The spindle travel is controlled by a handwheel on the front of the headstock and its value can be easily read on a dividing ring. The spindle sleeve with the spindle can be locked in the set position. The swivelling vertical headstocks swivel 45° either way. A part of the weight of these headstocks is carried on the guideways of the cross rail by ball bearings so they can be moved by a relatively small force.

Fixed horizontal headstock.

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SPECIFICATION

FP12-FP16

		FP 12	FP 13	FP 14	FP 16
TABLE:					
Clamping surface of table	mm	950 × 2000	31" × 118"	1250 × 3000	50" × 144"
T-slots: number		5		5	
width and pitch	mm	22 a 140	Metric 5/8"	22 a 140	22 a 140
Length of bed	mm	4000	20 feet	7000	24 feet
Travel of table	mm	2750	9 feet	3200	10 feet
Rate of table feed infinitely variable within the range of	mm per min	25 to 750	1" to 30"	25 to 750	1" to 30"
Rapid traverse of table	mm per min	4000	13 ft	4000	13 ft
HEADSTOCKS:					
Taper in spindle	ISA	50		50	
Diameter of spindle sleeve	mm	220	8½"	220	8½"
Axial movement of spindle sleeve	mm	250	10"	250	10"
Number of spindle speeds		18		18	
Range of spindle speeds,					
socket 1, on request	r.p.m.	31 to 710		31 to 710	
series B, standard	r.p.m.	14 to 900		14 to 900	
Number of horizontal and vertical headstock feeds		6		6	
Range of horizontal and vertical headstock feeds	mm per min.	20 to 500	1" to 20"	20 to 500	1" to 20"
Rapid traverse of horizontal and vertical headstock	mm per min.	1000	3 ft	1000	3 ft
Vertical rapid traverse of cross rail	mm per min.	1000	3 ft	1000	3 ft
MAIN DIMENSIONS OF MACHINE:					
Distance, between housings	mm	1260	4'-1½"	1660	5'-5½"
Distance, clamping surface of table to bottom of bed	mm	850	34"	850	34"
Distance, clamping surface on table to nearest vertical spindle	mm	160 to 1150	6" to 39"	160 to 1550	6" to 59"
Distance clamping surface of table to centre line of horizontal spindles	mm	190 to 1400	7" to 55"	190 to 950	7" to 37"
Distance between both horizontal spindles	mm	520 to 1020	20" to 40"	900 to 1400	35" to 54"
Distance between both horizontal headstocks	mm	1120	44"	1520	60"
Minimum centre-to-centre distance between vertical spindles	mm	410	16½"	410	16½"
Headstock motor	kW	9/13		9/13	
Table feed motor ("Ledonat") adjustable	3 kW	15		15	
Headstock feed motor	kW	4,4		4,4	
Cross rail elevating motor	kW	4,5		4,5	
Weight of machine	kg	28 500	61 730 lb	39 000	85 980 lb

All the illustrations of design are continuously being made, so that the machine is not to be regarded as binding in design and dimensions.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

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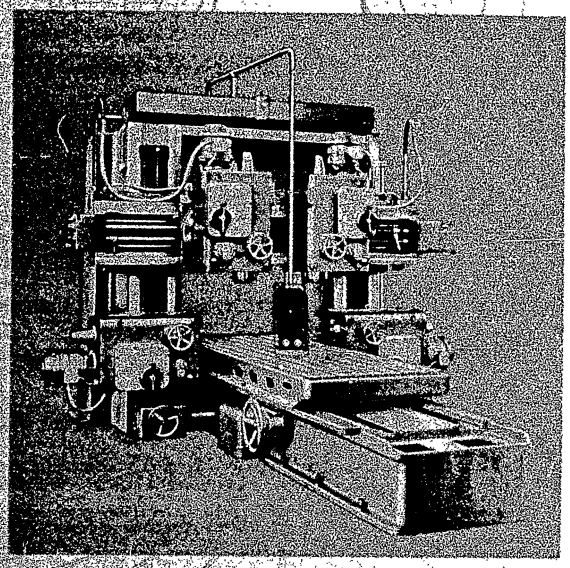

PLANO MILLERS

FP12-FP16

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DESCRIPTION

Each milling unit is an independent assembly with its own drive by a two-speed flange mounted electric motor with an output of 16/22 HP.

The spindle speeds may be changed in the following 16 steps:
10, 16, 20, 25, 31, 40, 50, 62, 80, 100, 125, 160, 200, 250, 315 and 500 r. p. m.

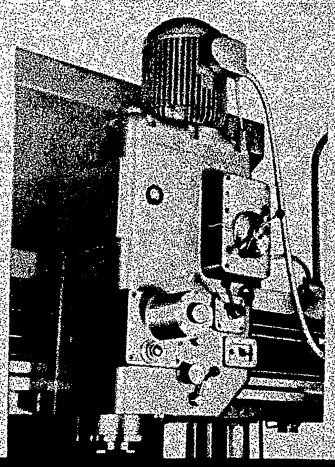
The Spindle is mounted in bearings at three points. The front end of the spindle runs in a precision two-row roller bearings with a tapered bore which affords a very fine adjustment of play.

The Spindle Travel is automatic and operated by an electric motor which is started by a push button on the portable suspended control panel. The precision power setting of the vertical spindles to their pre-selected positions is done by electrical disconnection and movement against a positive stop. The setting can also be done by a hand wheel and it is indicated on a dividing ring.

Relieved Weight of Vertical Milling Units. In order that the movement of the milling heads on the cross rail may not be unnecessarily hard a part of the weight of these units is carried on the guideways by ball bearings.

The Feeds of the Milling Units are mechanical as well as manual. The units may be moved by hand from the right-hand as well as from the left-hand side of the machine. The settings are indicated on a scale or, more accurately, on dividing rings. Apart from that, the vertical milling units can be moved by hand by means of a hand lever sliding along the lead screw.

The power feeds can be changed in the following 8 steps:
30, 40, 50, 80, 125, 200, 315, 500 mm per min.
[illegible] per min.



Rapid Traverse. The milling units may also be moved by rapid traverse at a rate of 1000 mm per minute (3'3" per min.).

Safety Clutch. In case of sudden overload or in the event of striking an obstacle the feed mechanism is protected by a safety clutch. The extreme positions of the milling units are secured by limit switches.

The horizontal milling units are balanced by counterweights arranged inside the housings.

The milling units can be clamped to the guideways of the housings in their set positions.

The Cross Rail carrying the vertical milling units is vertically adjustable by a 750 mm per minute (2'7" per min.) power rapid traverse. This movement is controlled by push buttons on the portable panel. The cross rail is clamped automatically to the guideways in its set position by means of a motor driven clamping arrangement. A multi-plate safety clutch protects the lifting mechanism against damage by sudden overload or when striking an obstacle. The extreme positions of the cross rail are secured by limit switches.

The Table has flat guideways with adjustable gibs for eliminatig the play. The table feeds are transmitted by a worm engaging with the rack of the table. This arrangement ensures a smooth, uniform movement without vibrations and is self-locking. The feed mechanism is driven by an electric motor fed by a Ward-Leonard set. The rate of table feed is infinitely variable within a range of 25 to 750 mm per min. (1" to 30" per min.) by two push buttons on the portable panel. The selected rate of feed within a certain range is indicated by dials on the portable panel. The table can be moved rapidly in either direction by a 4000 mm per min. (13 feet per min.) rapid traverse. The movement of the table by the power feed can be limited by adjustable stops which, acting through electric switches, stop the feed motor. The table can also be moved by means of hand wheels at either side of the table, the movement of the table being indicated on dividing rings. The table can be locked in its position for transverse milling by tightening the appropriate levers.

The Bed is provided with densely spaced ribs all along its length and is twice as long as the table so that the table does not overlap even in its extreme positions.

The Lubricating System of all moving parts and driving mechanisms is an automatic circulating system. The guideways of the milling units and the lead screw nuts are lubricated by hand pressure lubricators.

The Cooling System. The tools are cooled by the coolant supplied by an electric motor driven pump from a tank arranged at the rear near the bed. The used fluid is collected in sumps at the ends of the table from which it returns to the tank by troughs through screens.

STANDARD EQUIPMENT

2 vertical and 2 horizontal fixed milling units, complete electrical equipment including electric motors and Ward-Leonard set with switch box, four milling arbors 50 mm dia. with clamping screws, set of spanners, grease gun, checking bridge for re-levelling the bed, set of levelling plates for bed, cooling equipment, lighting of machine, operator's instruction booklet.

SPECIAL DESIGN AND EQUIPMENT

The machine can be supplied by special agreement and at a revised price, with various modifications of the number of milling units and or with swivelling milling units. Details on application.

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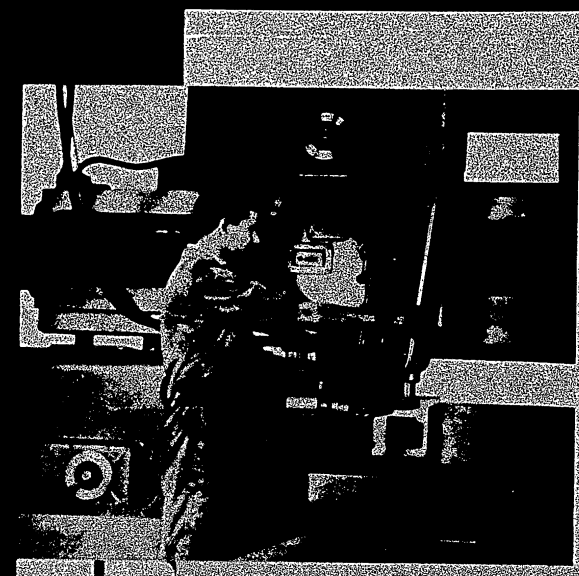

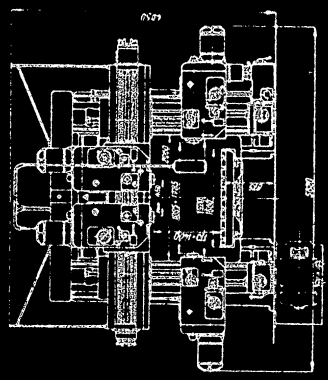

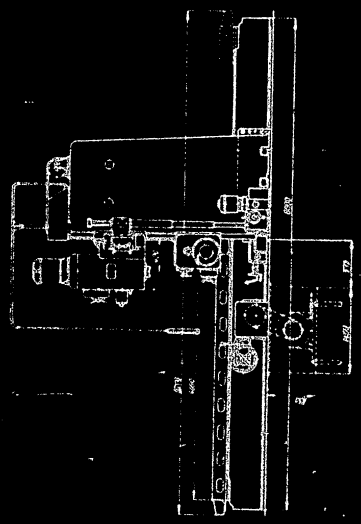

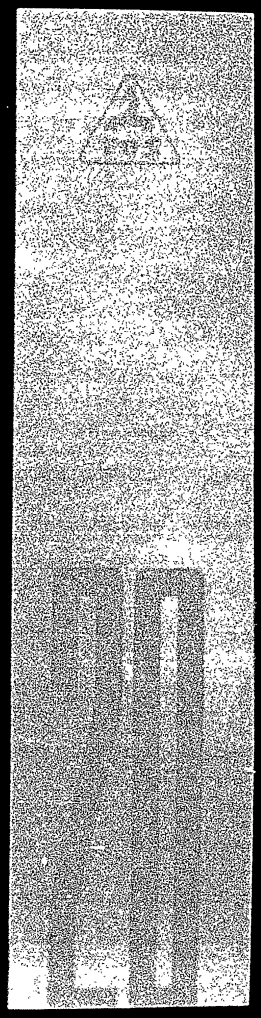

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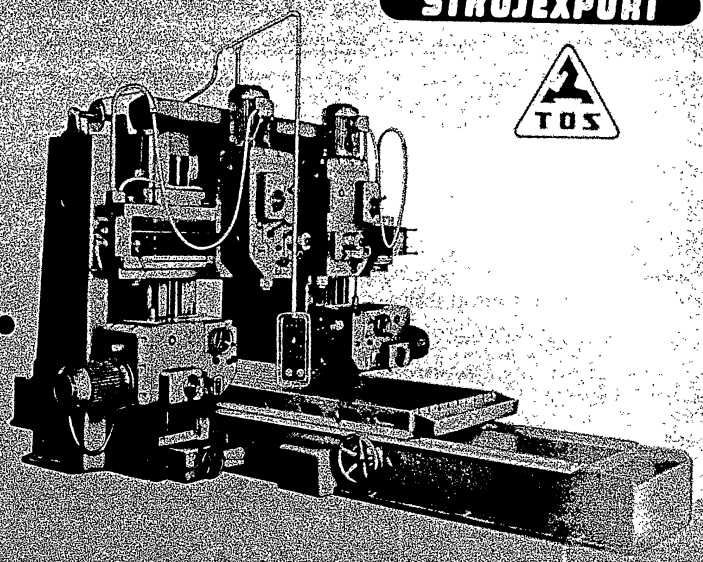

Type

PLANO MILLING MACHINE FP 20

This high duty Plano milling machine is intended for milling operations, particularly on large machinery parts, and makes possible multi-cutter work by the use of horizontal, vertical and slanting milling heads.

The standard design of the machine is fitted with four vertical milling units. Apart from the standard design the machine can be supplied with various modifications of the number of milling units.

SPECIFICATION

Table			
Clamping surface of table, width / length	mm	1400 / 4000	55" / 160"
T-slots: number		9	
width rod distance	mm	28 / 165	1 1/16" / 6½"
Length of bed	mm	8000	315"
Travel of bed	mm	3700	145"
Length of table feed infinitely variable within the range of	mm per min.	25 to 750	1" to 30" per min.
Rapid traverse of table	mm per min.	1000	39 ins per min.
Milling Units			
Number of horizontal milling units		2 fixed	
Number of vertical milling units		2 fixed	
Taper in spindle		6K	6
Diameter of spindle sleeve	mm	150	6
Axial movement of spindle sleeve	mm	250	10
Number of spindle speeds		12	12
Range of spindle speeds	r.p.m.	10 to 500	10 to 500
Number of horizontal and vertical milling unit feeds		8	8
Range of horizontal and vertical milling unit feeds	mm per min.	20 to 500	1" to 20" per min.
Rapid traverse of horizontal and vertical milling units	mm per min.	1000	39" per min.
Vertical rapid traverse of cross rail	mm per min.	750	29" per min.
Main Dimensions of Machine			
Distance between housings	mm	5000	197"
Distance, clamping surface of table to bottom of bed	mm	875	34½"
Distance, clamping surface of table to axis of horizontal spindle	mm	110 to 1400	4½" to 55"
Distance, clamping surface of table to vertical line of horizontal spindles	mm	1200 to 3150	47" to 124"
Distance between two horizontal spindles	mm	1185 to 1785	47" to 70"
Distance between two horizontal milling units	mm	1710	67"
Minimum centre-to-centre distance between vertical spindles	mm	450	18"
Spindle motor (pole-changing)	kW	11/15	
Motor for table feeds (Leonard) variable speed	kW	15	
Motor for milling unit feeds	kW	4	
Motor for raising the cross rail	kW	4	
Weight of machine	kg	40 000	110 000 lbs

As improvements in design are continually being made, these figures are for information only and are not to be regarded as binding.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS

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Specification

Working surface of table	mm	750 × 200	29 1/2" × 7 7/8"
Number × width × distance between T-slots	mm	3 × 14 × 45	3 × 9/16" × 1 3/4"
Swivel of table in either direction		45°	
Taper in spindle: standard		ISA 32	
optional		Metric 24	
optional		No. 3 Morse	
Distance, centre line of spindle to table, maximum	mm	345	13 1/2"
minimum	mm	25	1"
Number of spindle speeds		9	
Available ranges of spindle speeds (range to be selected by customer) range I	r.p.m.	67 to 1020	
range II	r.p.m.	95 to 1450	
range III	r.p.m.	132 to 2050	
Longitudinal travel of table, hand/power	mm	435/425	17 1/8" × 16 3/4"
Cross travel of table, hand	mm	175	6 7/8"
Vertical travel of table, hand	mm	320	12 1/2"
Number of power feeds		9	
Available ranges of power feeds (range to be selected by customer) range A mm per min.		12 to 195	15/32" to 7 11/16"
range B mm per min.		17 to 270	21/32" to 10 5/8"
range C mm per min.		23 to 375	29/32" to 14 3/4"
Motor power	HP	1.5 to 2	
speed	r.p.m.	1400	
Belt pulley, dia × width	mm	120 × 60	4 3/4" × 2 3/8"
Weight of machine with standard equipment	kg	760	1680 lbs
Shipping weight of machine, seaworthy packing	kg	920	2030 lbs
Dimensions of packing case	mm	1400 × 1300 × 1700	4'7" × 4'3" × 5'7"
Volume of packing case	m^3	2.95	105 cu. ft.

Standard Equipment

1 complete milling arbor, 22 mm dia., 1 clamping screw, cooling equipment with electric motor and piping, switch [illegible] grease gun, set of spanners, operating instructions.

Optional Equipment

Electric motor, belt pulley for electric motor, belt, electric lighting, type DH 10 universal dividing attachment for which a vertically adjustable tailstock, a cross plate and a support for the milling of long objects can be supplied to special order, type PD 2 longitudinal dividing attachment, type SR 2 circular table, type HS 2 vertical milling head, type UH 2 universal milling head.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.

Please state in your order the voltage available for the electric motor.

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SPECIFICATIONS

FA 2V

Table: Working surface: width	ins.	7.87
length	ins.	39.4
Number of T-Slots		3
Width × distance of T-Slots	ins.	0.55 × 1.66
Longitudinal travel: by hand	ins.	25.2
by power	ins.	24.6
Cross travel: by hand	ins.	8.3
Vertical movement: by hand	ins.	14.75
Spindle: Standard taper hole	ISA	44
On demand metric	No.	32
Morse	No.	3
Diameter in front bearing	ins.	2.16
Vertical adjustment	ins.	2.36
Head swivels in both directions		45°
Distance from spindle nose to top of table: maximum	ins.	14.8
minimum	ins.	0
Distance from centerline of spindle to column	ins.	9.8
Spindle speeds: number		12
standard series	R. p. M.	63 – 2600
high series	R. p. M.	90 – 4000
Longitudinal table feeds: Number		13
Range	ins./Min.	9.16 – 37
Power rapid traverse: Longitudinal	ins./Min.	110
Drive: Main motor: Speed	R. p. M.	1430
input	HP	3.75
Feed motor: Speed	R. p. M.	2770
input	HP	0.7
Shipping data: Floor space required	ins.	54.5 × 59.3
Weight of machine: with standard equipment	lbs.	1680
with railway packing	lbs.	2100
with seaworthy packing	lbs.	2130
Size of case	ins.	55 × 55 × 61
Contents boxed	cu. ft.	106

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling equipment, 2 grease guns, set of wrenches, booklet

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

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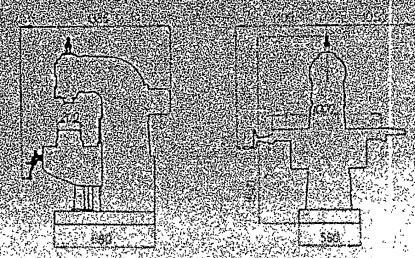

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Type F2U UNIVERSAL MILLING MACHINE

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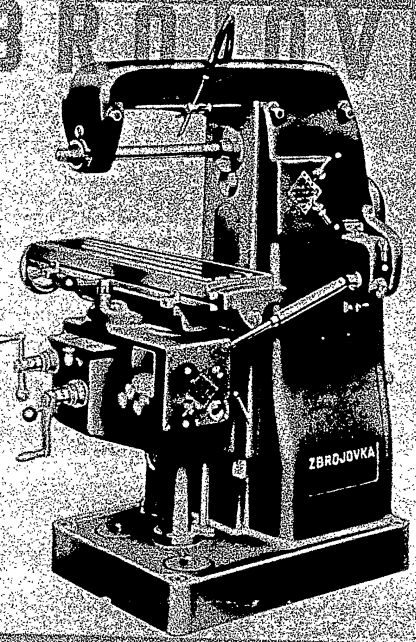


The machine is intended for precision milling operations on small machinery parts and is used to advantage for single piece as well as repetition work.

The high spindle speeds permit light metals to be machined economically.

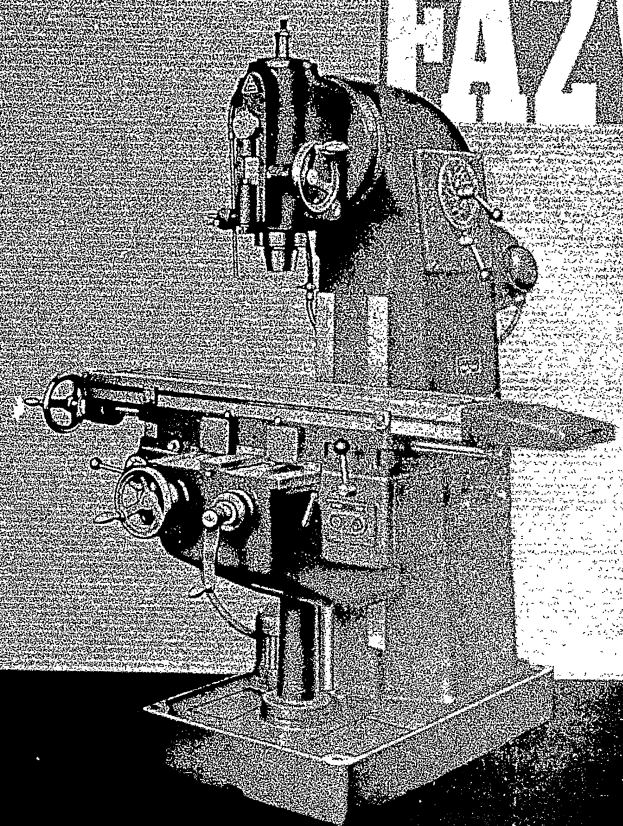
The machine is equipped with longitudinal power feeds variable within a wide range.

The 9 spindle speeds and 9 power feeds, of which three ranges are available, are easy to change by means of two levers.

The choice of a definite range of spindle speeds and of a definite range of power feeds available to the customer enables him to select a machine correctly equipped with the speeds and feeds most suitable for the contemplated kinds of work.

The variety of additional accessories and attachments supplied for the machine as optional equipment considerably increases its versatility.

FA2V



VERTICAL MILLING MACHINE Model FA2V

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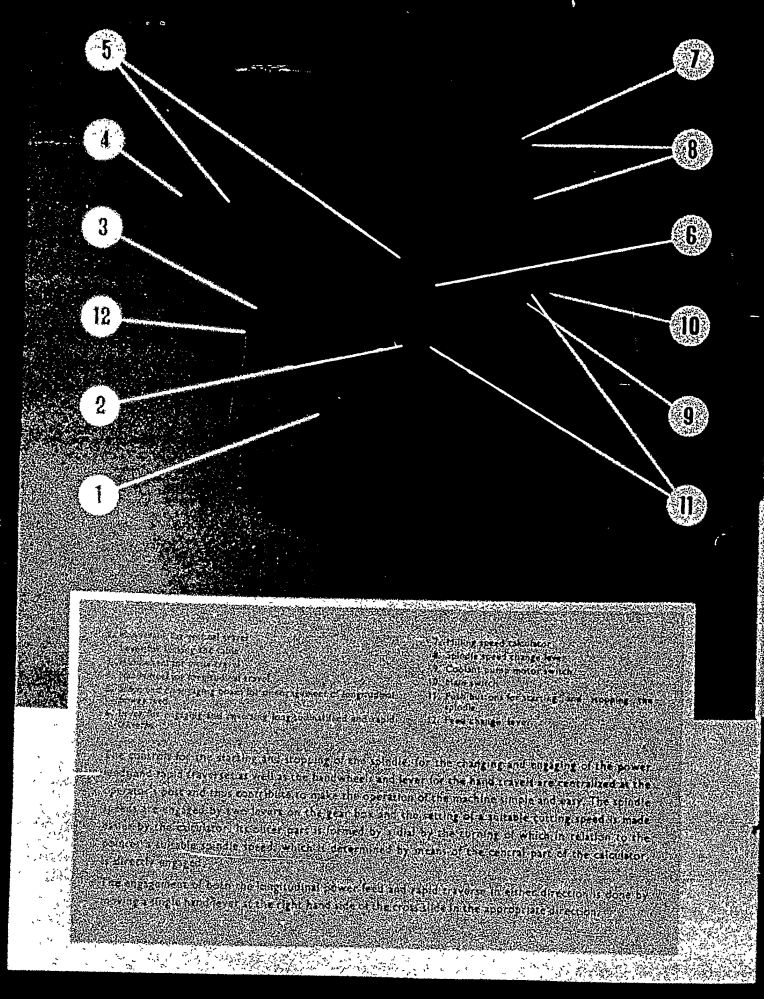


OPTIONAL EQUIPMENT

The attachments and equipment described below, which increase the versatility of the machines and which make them suitable, apart from surface milling, for circular milling and the cutting of gears, racks, helices, cams, etc. will be supplied to order.

The Type DUA 2 Universal Dividing Head

for plain, compound and differential dividing and the milling of helices and cams by power feed. Dividing range 2 to 400 divisions. Range of pitch of helices: 20 to 6000 mm per revolution of dividing head spindle. Height of centers 100 mm (3 15/16"). Apart from the standard accessories, which include a tailstock, dividing plate, a set of change gears, a quadrant for the change gears, centers with a driver, a set of spanners and operating instructions with tables, the following items are available to special order and against extra charge: a vertically adjustable tailstock, a cross plate, a support for the milling of long objects and a quadrant for the milling of low pitch threads.

The Type PDA 2 Rack Milling Attachment

A longitudinal dividing attachment intended chiefly for the milling of racks.

The Type HVA 2 Vertical Milling Attachment

This attachment, the spindle of which can be rotated in a plane perpendicular to the centre line of the spindle of the machine, permits many operations to be performed on horizontal and universal machines which would otherwise require the use of a vertical milling machine.

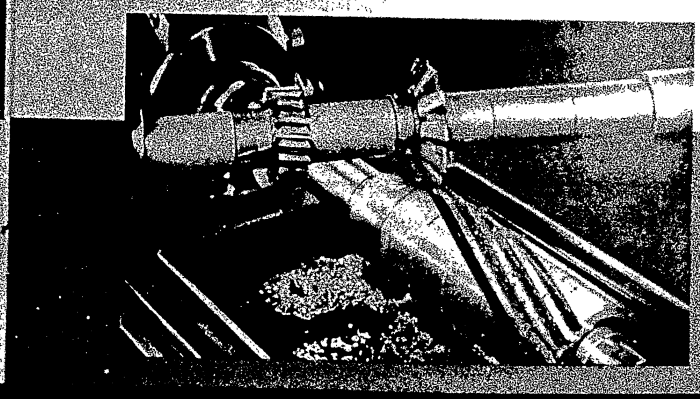
The Type HUA 2 Universal Milling Attachment

has a spindle which can be set in any position. It is intended for the machining of surfaces which are difficult of access, particularly slanting ones and for jobs where the centre line of the spindle must be parallel to the longitudinal table feed, for example in rack cutting.

The Type SRA 2 Circular Milling Attachment

hand-operated. The circumference of the table is divided into 360°. The table is fed 4° per revolution of the handwheel. The dial on the indexing ring affords indexing with an accuracy of 5'.

Machine vises and milling arbors of various clamping diameters and lengths are also available for all attachments. This optional equipment will be listed in a special catalogue.



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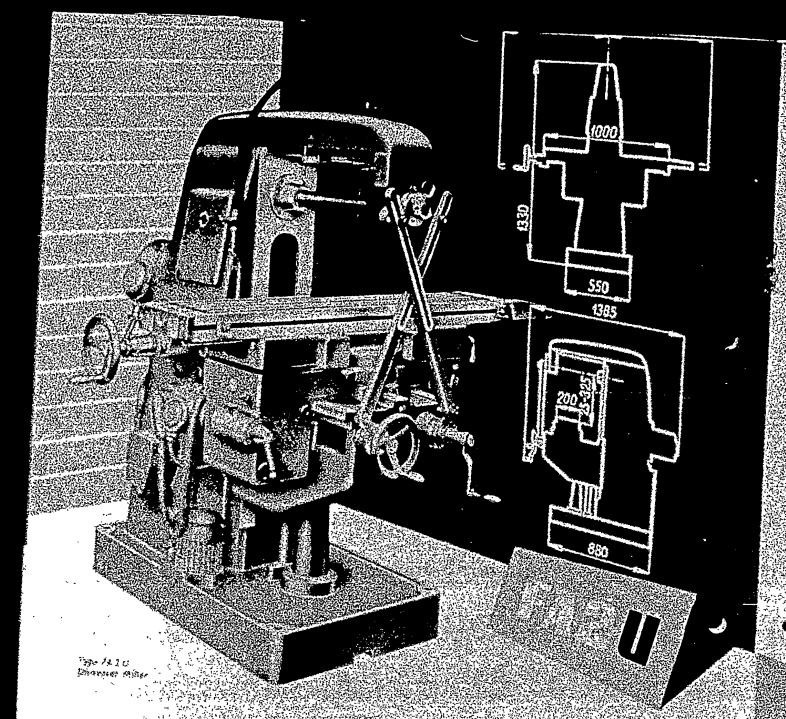

Type FA 2 U
Universal Miller

OPERATIONAL FEATURES

The machines are equipped with a longitudinal rapid traverse for quick movement of the table. A quick engagement of the rapid traverse and instantaneous change-over to the working feed is made possible by a multi-plate clutch of new design in the transmission. The power feed and rapid traverse can be disengaged by adjustable stops which stop the feed motor by means of electric switches.

The vertical adjustment of the spindle of vertical machines is operated by a handwheel. The travel of the spindle can be limited by a telescopic stop which may also be used as a positive stop. The milling depth may be adjusted by inserting slip gauges or according to a dial gauge built into the upper part of the stock. An important aid for determining the correct spindle speed is the calculator by the setting of which the speed corresponding to the material being machined, the material of the tool, the diameter of the tool and the desired grade of surface finish is directly engaged.

The machines are equipped with an electric motor driven pump which supplies coolant from a tank in the base plate of the column to the tool. The used coolant is drained from the working table and cross slide into the wide spaces inside the knee from which in most cases two oil pockets on the two sides of the knee serve the oil to separate from the chips by settling and returns into the tank in the base plate where it is cleaned by several settling stages.

ZBROJOVKA

DETAILS OF DESIGN

The front end of the spindle runs in a precision double-row roller bearing with a tapered bore which permits the play in the bearing to be very finely adjusted. Also the high precision of the other spindle bearings ensures an exceptional accuracy of the spindle mounting.

The spindle is driven by a flange motor fitted to the rear wall of the column. The motor and, with it, the spindle is started by a pushbutton and stopped by another pushbutton. The direction of rotation of the spindle is controlled by the main switch on the right hand side of the column. The feeds and rapid traverse are driven by a flange mounted electric motor fitted at the rear of the feed box. The motor is protected against overload by a thermal overload relay. The gears of the feed box are protected against overload by a safety coupling.

The working table travels on the long guideways of the cross slide which moves on the broad guideways of the saddle. The table can be swivelled as much as 45° either way and secured in the swivelled position by means of [illegible]. Play in the guideways of the cross slide and table can easily be eliminated by adjusting the appropriate gibs.

The entire drive of the spindle as well as the speed change mechanism are lubricated by a gear pump [illegible] by the electric motor. Its function may be observed in the sight window in the right hand wall of the [illegible] and other parts of the feed box have a circulating oil lubricating system with an independent [illegible] the distributor is depressed by hand, distributes the oil simultaneously, on the one hand, to the [illegible] drive of the table and, on the other hand, to the guideways on the knee and cross slide.

The electrical equipment comprises the contactor group for the starting of the driving motor [illegible] the feed motor. The motors are protected against overload by relays and fuses. The switch gear [illegible] of the column.

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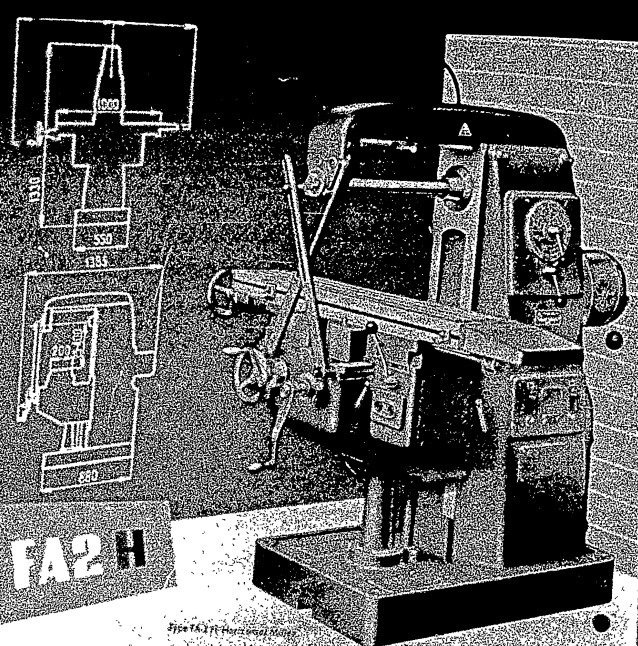
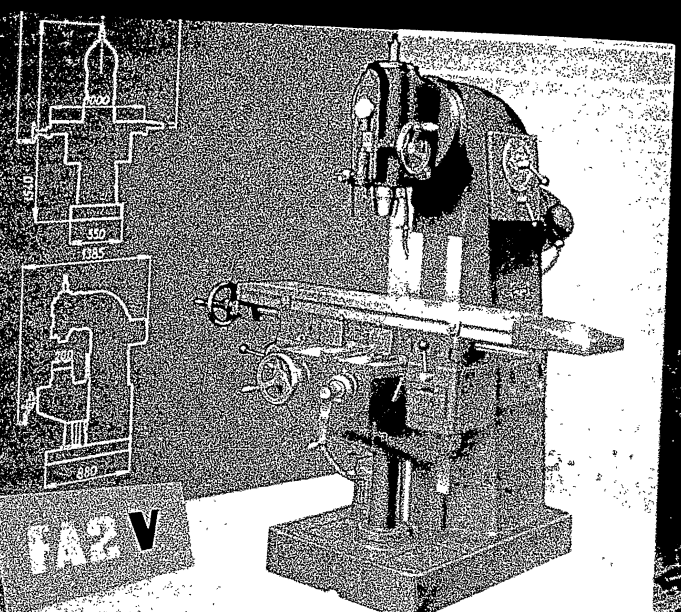


Type FA 2 H Horizontal Milling

ZBROJOVKA milling machines of the FA 2 series are machines built for the precision machining of small machinery parts. They permit all current milling operations to be carried out in steel as well as in non-ferrous and light alloys with a high degree of economy which is made possible by the wide range of spindle speeds and power feeds. They are marked by a particularly rigid design of the column and knee due to which they ensure smooth and accurate work and, as a result, also a high grade of finish of the machined surfaces. A number of outstanding features, such as the separate drive of the spindle and of the feeds by independent motors, the milling speed calculator, the electrically controlled disengagement of power feeds and rapid traverses, the accurate adjustment of the spindle of vertical machines by means of slip gauges or a dial gauge and the centralized and simple controls increase the value of these machines from the point of view of production. The low first cost contributes to the fact that the machine pays for itself quickly.



SCOPE OF WORK

The milling machines of the FA 2 series are [illegible] designs:

Horizontal, type FA 2 H, intended for [illegible]

Vertical, type FA 2 V, with swivelling head [illegible]

Universal, type FA 2 U, arranged for power drive of the work spindle of the universal dividing head [illegible] a swivelling movement. In addition to surface milling they are suitable for circular milling, cutting of gear [illegible] racks, etc. The versatility of the machine is increased by attachments and equipment such as the universal [illegible] rack milling attachment, universal milling attachment, hand-operated circular milling attachment, etc. [illegible] for the machine as optional equipment.

All designs are distinguished by a wide range of spindle speeds which offers cutting speeds suitable for [illegible] materials used in the metal working industry, from steels to light metals. The machines may be ordered either with a standard or with a high range of spindle speeds to suit the contemplated kinds of work:

Standard Range: 63, 90, 125, 180, 250, 355, 500, 710, 1000, 1400, 2000, 2800 r. p. m.

High Range: 90, 125, 180, 250, 355, 500, 710, 1000, 1400, 2000, 2800, 4000 r. p. m.

The machines are equipped with longitudinal power feeds arranged in the following thirteen steps:

14, 20, 28, 40, 56, 80, 112, 160, 224, 315, 450, 630, 900 mm per min

[illegible] 1 [illegible] 2 [illegible] 3 [illegible] 4 [illegible] 6 [illegible] 8 [illegible] 12 [illegible] 17 [illegible] 24 [illegible] 35 [illegible] inches per min

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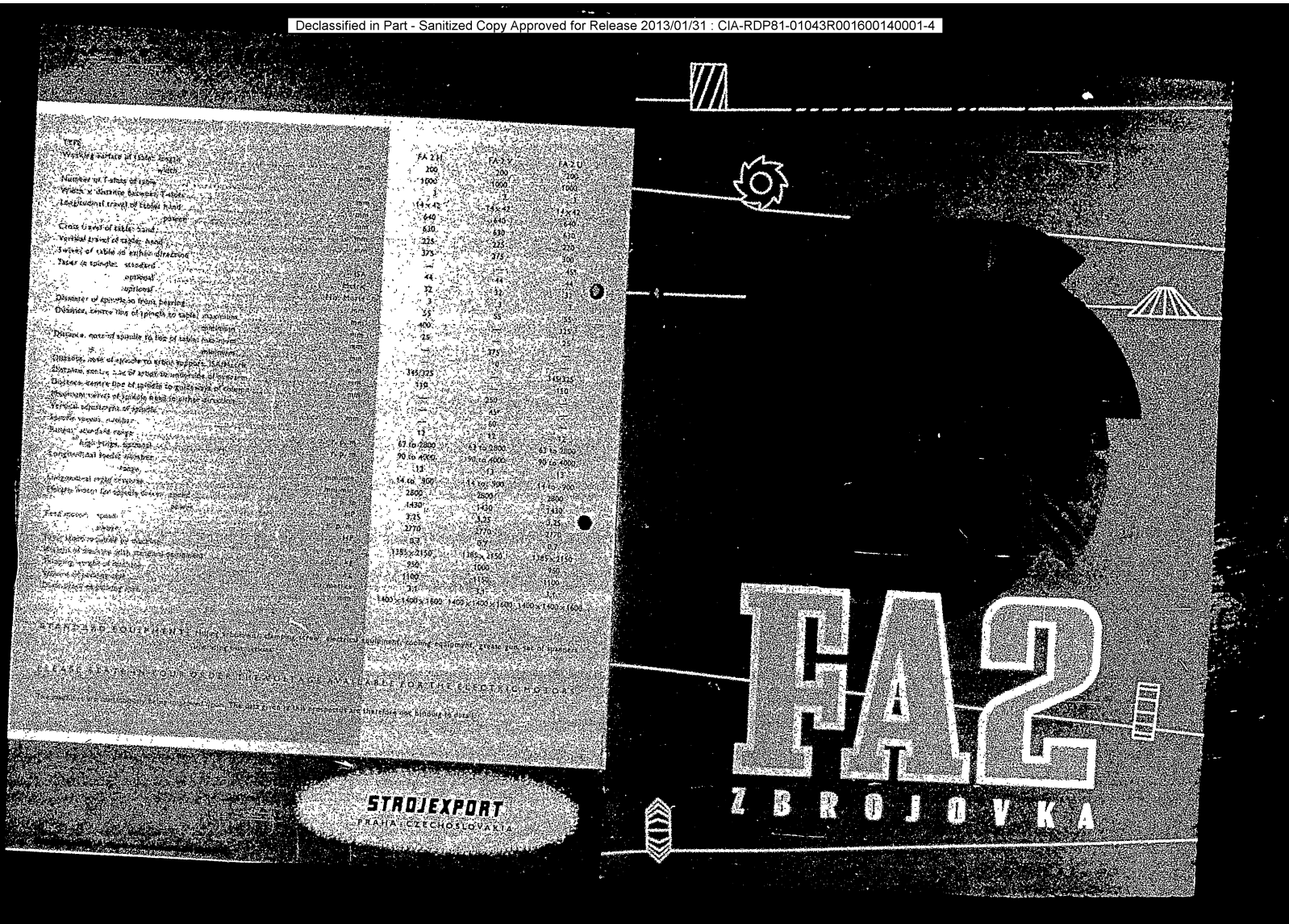

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H a

Specifications:

			Metric	English
Table	Working surface of table (length x width)	mm	1350 x 300	53 x 11.8"
	Number x width x distance between T-slots	mm	4 x 18 x 80	3 x 0.71" x 3.15"
	Longitudinal travel by hand/by power	mm	800/750	31.5"/29.6"
	Cross travel by hand/by power	mm	310/300	12.2"/11.8"
	Vertical travel by hand/by power	mm	485/400	19"/15.2"
Spindle	Diameter of spindle in the front spindle bearing	mm	90	3.54"
	Taper in spindle: standard	ISA	70	70
	on request	Morse	5	5
	Distance, centreline of spindle to lower surface of overarm	mm	155	6.1"
	Spindle speeds: number		16	16
	standard range	r.p.m.	31.5—1000	31.5—1000
	lower range	r.p.m.	20—630	20—630
Feeds	Number of feeds		2 x 12	2 x 12
	Range of longitudinal and cross feeds	mm/min	10—790	0.4"—31" per min.
	Range of vertical feeds	mm/min	6—490	0.25"—19" per min.
Rapid traverse	Longitudinal and cross rapid traverse	mm/min	2085	82" per min.
	Vertical rapid traverse	mm/min	1260	49.5" per min.
Drive	Electric motor: speed	r.p.m.	1400	1400
	output	kW	4.5	4.5
Dimensions and weights	Floor space required: length approx.	mm	1850	73"
	width approx.	mm	2510	98"
	height approx.	mm	1670	67"
	Weight of machine with standard and electrical equipment approx.	kg	1900	4200 lbs.
	Weight of electric motor approx.	kg	54	120 lbs.
	Weight of domestic packing approx.	kg	300	660 lbs.
	Weight of seaworthy packing approx.	kg	350	770 lbs.
	Contents boxed	m³	6.45	227 cu. ft.

Caution!

In ordering, specify taper in spindle, spindle speed band, and current characteristics (voltage, phase and frequency). The optional equipment should be ordered with the machine as otherwise the same time of delivery for machine and equipment cannot be guaranteed.

Standard Equipment:

complete electrical installation and equipment including motor, cooling attachment, complete milling arbor dia. 27 mm with taper to suit the spindle, clamping screw, oil can, set of spanners, operating instruction booklet.

Optional Equipment:

additional milling arbors, reducing sleeves, machine vice Model UP 2, swivelling vice Model UO 2 or tilting and swivelling vice Model JSO 2, hand operated circular table Model MR 400, dia. 400 mm, power-driven circular table Model MK 400, dia. 400 mm, universal milling attachment Model FHU 2 or vertical milling attachment Model VH 2a, universal indexing attachment Model D 2a, rack indexing attachment Model FP 5, spot light.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

STROJEXPORT PRAHA CZECHOSLOVAKIA

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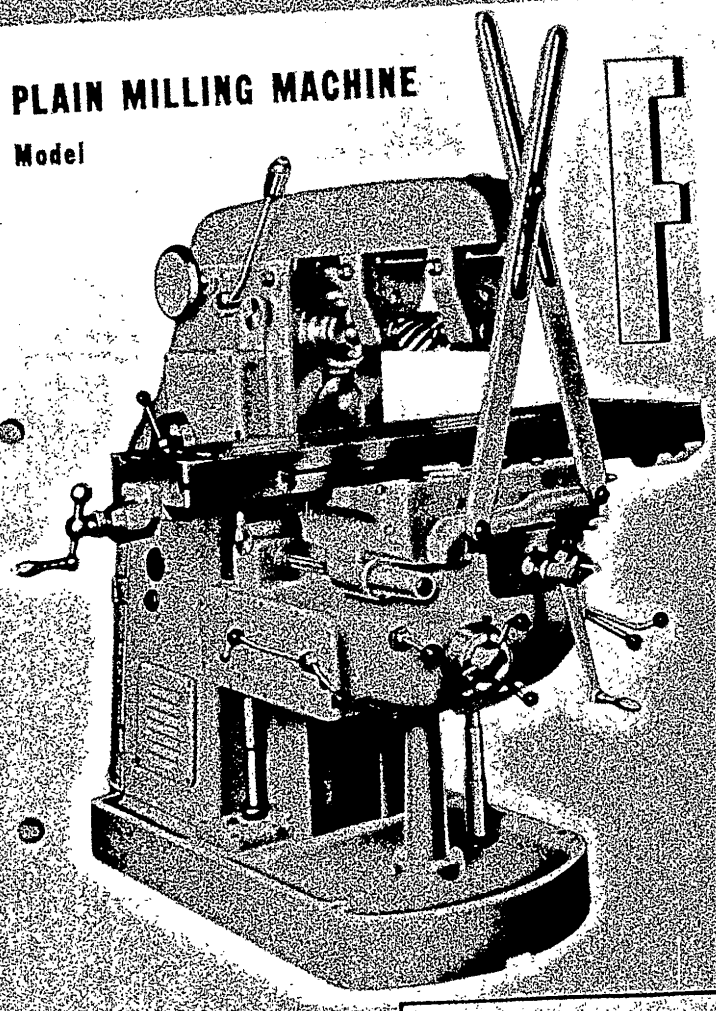
PLAIN MILLING MACHINE

Model

FH2a



TOS

This is a High Duty Precision Machine for heavier milling operations both in the single part and quantity production.

Characteristic Features and Advantages:

The machine is made of carefully selected, inspected, and heat-treated materials.

All parts are interchangeable.

The motor is controlled by a pushbutton in the handle of the main operating lever, a pilot lamp being provided in the handle for signalising the running of the motor.

The spindle speeds are 18 in number and are changed by shifting a single cross lever.

A wide spindle speed range makes the machine suitable for the machining of all classes of materials with various kinds of cutters.

The machine can be supplied equipped with a standard or high spindle speed bands.

The available power feeds are 3 x 12 in number and are changed by a single cross lever independently of the spindle rotation.

The power feeds and the rapid traverse are changed in the cross, longitudinal and vertical direction.

The feed speed is reduced to the half of its maximum by merely shifting the lever on the feed box.

Automatic central lubrication of the gearbox.

Automatic central lubrication of the knee and feed box.

Central pressure lubrication of the cross slide; all dialing points are lubricated simultaneously by depressing a single lever.

Safe and easily accessible electrical equipment is provided.

Numerous attachments greatly contribute to the versatility of the machine.

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SPECIFICATIONS

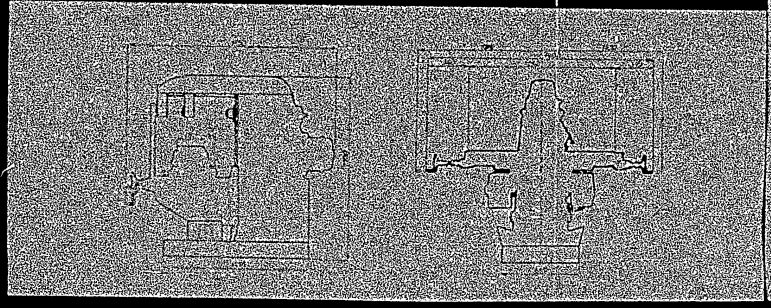
Table: Working surface: width		ins.	9.8
length		ins.	49.2
Number of T-Slots			3
Width x distance of T-Slots		ins.	0.55 x 2.16
Longitudinal travel: by hand		ins.	32
by power		ins.	31.5
Cross travel: by hand		ins.	9.3
by power		ins.	8.8
Vertical movement: by hand		ins.	14.2
by power		ins.	13.8
Table swivels in both directions			45°
Spindle: Standard taper hole		ISA	40
On demand metric		No.	40
Morse		No.	6
Distance from centerline of spindle to top of table: maximum		ins.	14.6
minimum		ins.	2.4
Distance from spindle nose to inside of arbor support		ins.	19.7
Distance from centerline of arbor to underside of overarm		ins.	7.5
Distance from column to bench		ins.	22.2
Spindle speeds: number			12
standard series	R.p.M.		45—2000
high series	R.p.M.		60—2800
Feeds: Number			15
Range of longitudinal and cross feeds		ins./min.	0.16—37
Range of vertical feeds		ins./min.	0.127—10
Power rapid traverse: Longitudinal and cross		ins./min.	110
Vertical		ins./min.	31
Drive, Main motor: Speed		R.p.M.	1430
Input		HP	3.2
Feed motor: Speed		R.p.M.	1380
Input		HP	1
Shipping data: Floor space required		ins.	74.5 x 70
Weight of machine: with standard equipment		lbs.	3420
with railway packing		lbs.	4000
with seaworthy packing		lbs.	4500
Cartons packed		No.	194

STANDARD EQUIPMENT: Milling arbor with clamping collar, coupling attachment, special equipment, 2 grease guns, set of wrenches, operator's instruction booklet.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

TO ORDERING: SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

KOVO PRAHA - CZECHOSLOVAKIA



SPECIFICATIONS

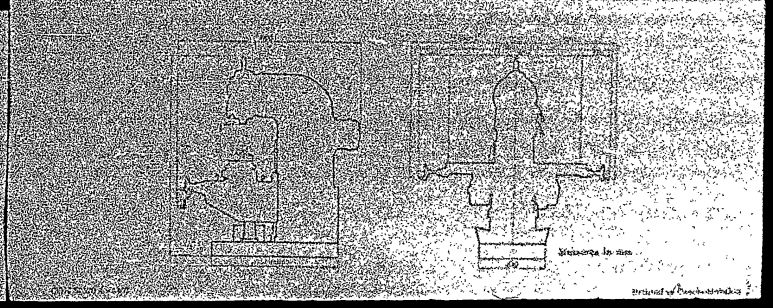
Table: Working surface: width		ins.	9.8
length		ins.	49.2
Number of T-Slots			3
Width x distance of T-Slots		ins.	0.55 x 2.16
Longitudinal travel: by hand		ins.	32
by power		ins.	31.5
Cross travel: by hand		ins.	9.3
by power		ins.	8.8
Vertical movement: by hand		ins.	14.2
by power		ins.	13.8
Spindle: Standard taper hole			45°
On demand metric		ISA	40
Morse		No.	40
Distance from centerline of spindle to top of table: maximum		No.	6
minimum		ins.	14.6
Distance from centerline of arbor to underside of overarm		ins.	2.4
Distance from column to bench		ins.	19.7
Spindle speeds: number		ins.	7.5
standard series		ins.	22.2
high series			12
Feeds: Number		R.p.M.	45—2000
Range of longitudinal and cross feeds		R.p.M.	60—2800
Range of vertical feeds			15
Power rapid traverse: Longitudinal and cross		ins./min.	0.16—37
Vertical		ins./min.	0.127—10
Drive: Main motor: Speed		ins./min.	110
Input		ins./min.	31
Feed motor: Speed		R.p.M.	1430
Input		HP	3.2
Shipping data: Floor space required		R.p.M.	1380
Weight of machine: with standard equipment		HP	1
with railway packing		ins.	74.5 x 70
with seaworthy packing		lbs.	3420
Cartons packed		lbs.	4000
		lbs.	4500
		No.	194

STANDARD EQUIPMENT: Milling arbor with clamping collar, coupling attachment, special equipment, 2 grease guns, set of wrenches, operator's instruction booklet.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

TO ORDERING: SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

STROJEXPORT PRAHA - CZECHOSLOVAKIA



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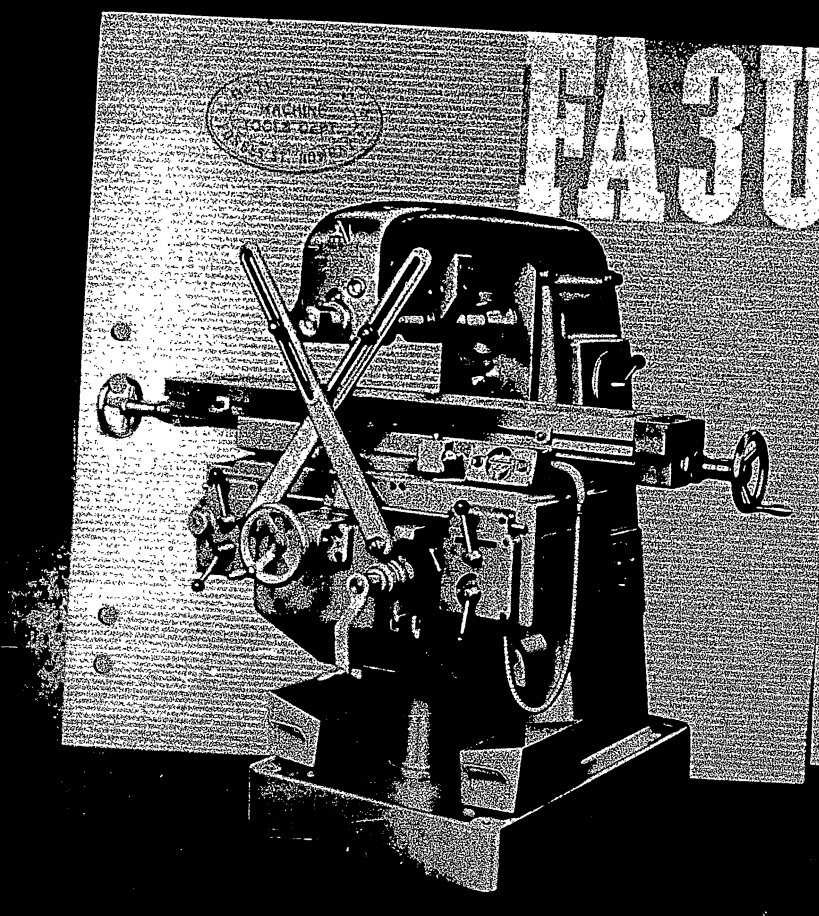
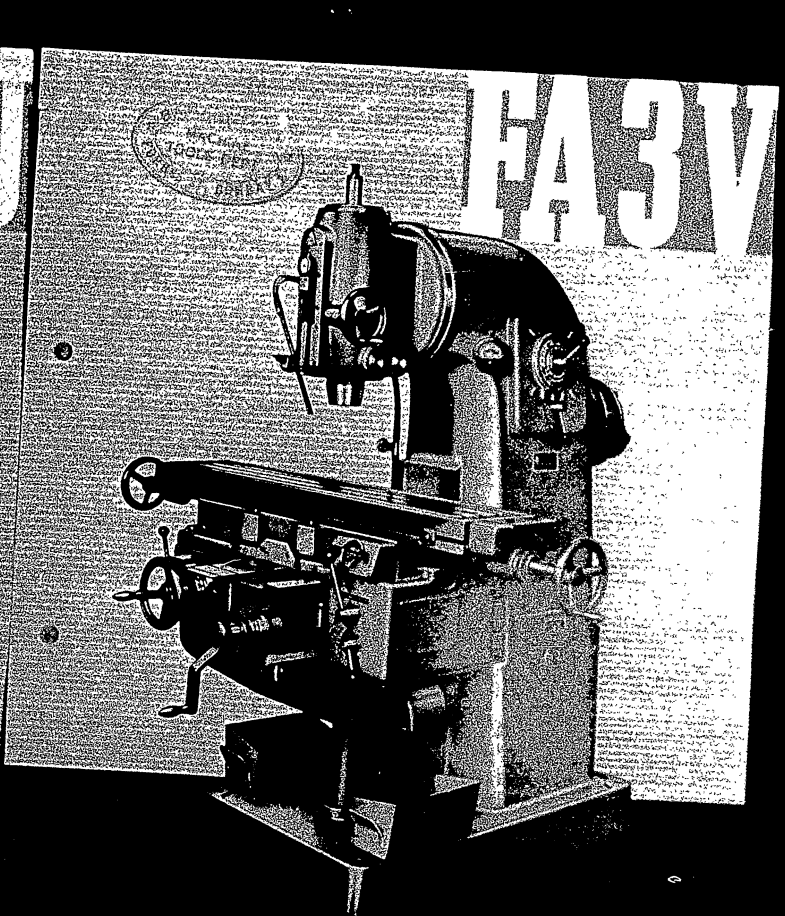
FA3U



UNIVERSAL MILLING MACHINE Model FA3U

TOS

FA3V



VERTICAL MILLING MACHINE Model FA3V

TOS

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SPECIFICATIONS

HA4H

Table - Working surface - width	ins.	12.4
length	ins.	63
Number of T-slots		3
Width x distance of T-slots	ins.	0.71 x 2.76
Longitudinal travel by hand	ins.	39.8
by power	ins.	39.4
Cross travel by hand	ins.	14.3
by power	ins.	12
Vertical movement by hand	ins.	17.1
by power	ins.	16.7
Spindle - Standard taper hole	ISA	70
On demand metric	No.	50
Morse	No.	5
Distance from centerline of spindle to top of table maximum	ins.	18.9
minimum	ins.	1.77
Distance from spindle nose to inside of arbor support	ins.	25.2
Distance from centerline of arbor to underside of overarm	ins.	6.3
Distance from column to brace	ins.	29.5
Spindle speed - number		12
standard series	R. p. M.	32—1400
high series	R. p. M.	45—2000
Feeds - Number		15
Range of longitudinal and cross-feeds	ins./min.	13/32—49
Range of vertical feeds	ins./min.	0.1—12.5
Power rapid traverse - Longitudinal and cross	ins./min.	126
Vertical	ins./min.	31.5
Driving Motor - Speed	R. p. M.	1430
Input	HP	7.5
On special order input	HP	10
Feed motor - Speed	R. p. M.	1390
Input	HP	1.5
Shipping data - Floor space required	ins.	77.5 x 83.5
Weight of machine with standard equipment	lbs.	5500
with railway packing	lbs.	6200
with seaworthy packing	lbs.	6800
Contents boxed	cu. ft.	248

STANDARD EQUIPMENT: Milling arbors with clamping nuts, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operating instructions.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

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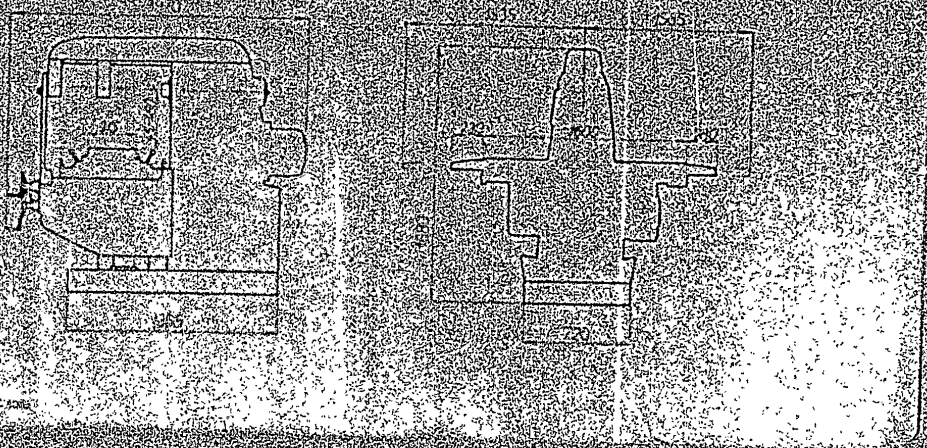

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SPECIFICATIONS

FA 4H

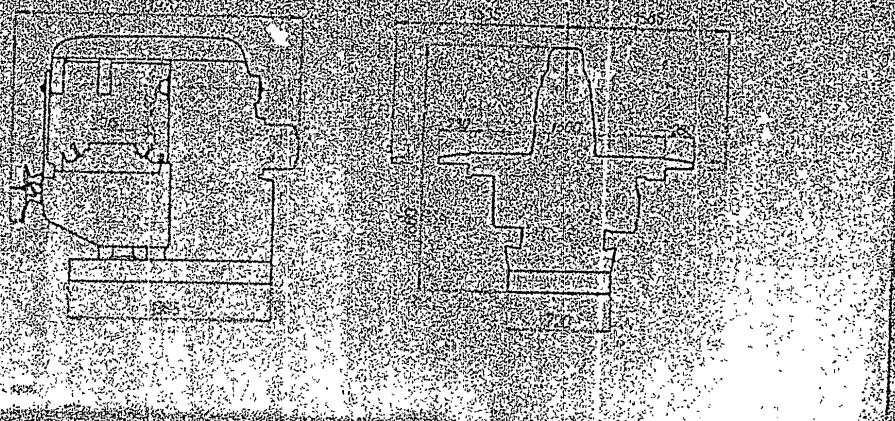
Table: Working surface: width	ins.	12.4
length	ins.	63
Number of T-slots		3
Width x distance of T-slots		0.71 x 1.76
Longitudinal travel: by hand	feet	37.8
by power	ins.	39.4
Cross travel: by hand	ins.	14.3
by power	ins.	14
Vertical movement: by hand	ins.	17.1
by power	ins.	16.7
Spindle: Standard taper hole	ISA	40
On demand metric	No.	50
Morse	No.	5
Distance from centerline of spindle to top of table: maximum	ins.	18.9
minimum	ins.	1.77
Distance from spindle nose to face of arbor support	ins.	23.2
Distance from centerline of arbor to underside of overarm	ins.	6.1
Distance from column to knee	ins.	29.5
Spindle speeds: number		12
Standard series	R. p. M.	32—1400
High series	R. p. M.	45—2000
Feeds: Number		13
Range of longitudinal and cross feeds	ins./min.	13/32—49
Range of vertical feeds	ins./min.	0.1—12.5
Power rapid traverse: Longitudinal and cross	ins./min.	126
Vertical	ins./min.	31.5
Drive: Main motor: Speed	R. p. M.	1430
Input	HP	7.5
On special order input	HP	10
Feed motor: Speed	R. p. M.	1390
Input	HP	1.5
Shipping data: Floor space required	ins.	77.5 x 83.5
Weight of machine: with standard equipment	lbs.	5500
with railway packing	lbs.	6200
with seaworthy packing	lbs.	6800
Contents boxed	cu. ft.	265

STANDARD EQUIPMENT: Milling arbor with clamping bolt, cooling attachment, electrical equipment, 2 grease guns, set of wrenches, operating instructions.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

KOVO PRAHA • CZECHOSLOVAKIA



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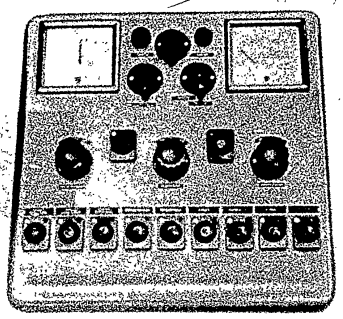


OPERATION

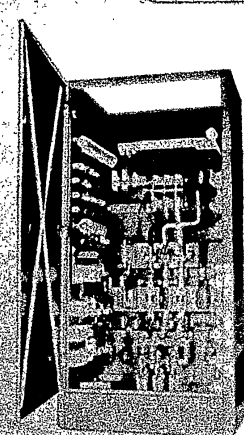
[illegible] of the foot heads and crossrail are remote controlled by means of push buttons from [illegible] control box as well as from the control desk. When the rapid traverse of the cross- [illegible] crossrail is automatically unclamped, and when the rapid traverse ist stopped, it [illegible] again.

[illegible] part is being clamped to the table, the starting push buttons can be locked from [illegible] the table from being started by oversight.

STROJEXPORT

STANDARD EQUIPMENT

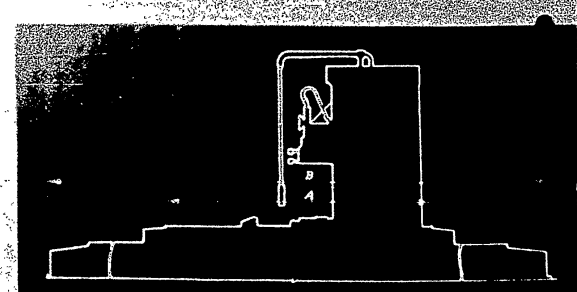
Two railheads on the crossrail, one right-hand sidehead and one left-hand sidehead, drive by means of Ward-Leonard set consisting of main electric motor, D.C. generator directly coupled to three phase slip-ring electric motor for connection to the power mains, oil immersed rotor starter, controlling elements including exciter (amplidyne), protective switch, distribution box, control desk and portable hook-on control box, spanners and operating instruction booklet.

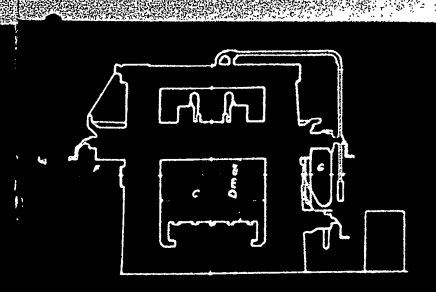


CABINET FOR ELECTRICAL EQUIPMENT

OPTIONAL EQUIPMENT

Lighting equipment including transformer to suit 220/24 V





HD 16 20a

	A	B	C	D	E	F	G
HD 16	4,000—12,000 157 15/32"—516 7/16"	10,260—26,260 403 15/16"—1033 15/16"	1,600 (63")	1,600 (63")	3,800 149 (19/32")	2,150 (84 5/8")	2,100 (82 21/32")
HD 20a	4,000—12,000 157 15/32"—516 7/16"	10,260—26,260 403 15/16"—1033 15/16"	2,000 (78 [illegible]")	2,000 (78 [illegible]")	4,200 (165 11/32")	2,350 (92 [illegible]")	2,300 (90 35/64")

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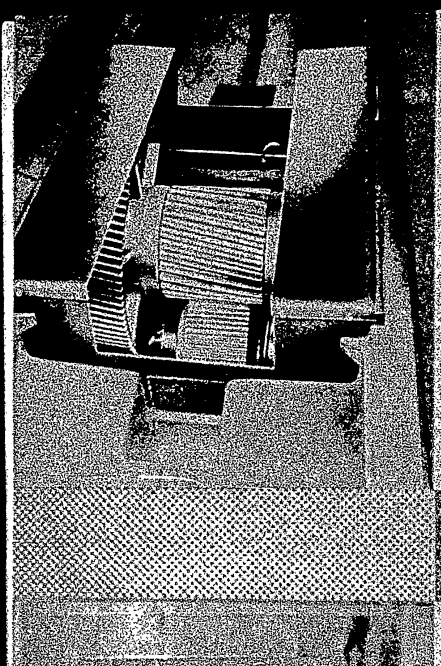


TABLE DRIVE

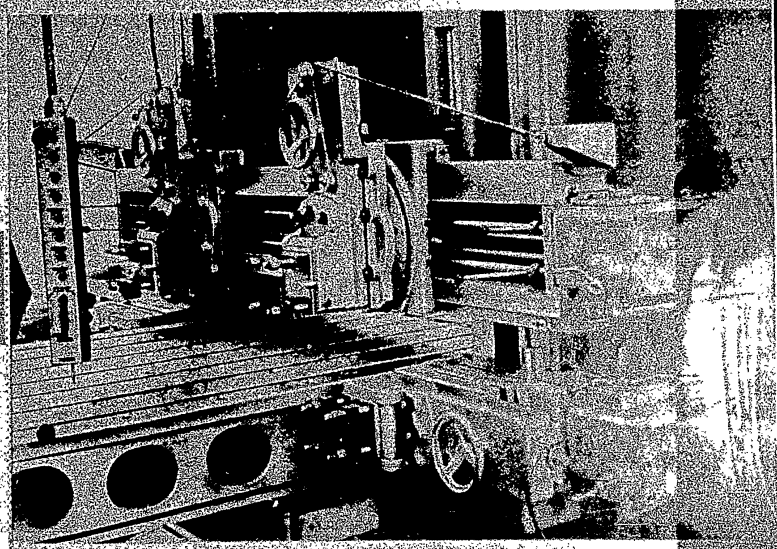
HYDRAULIC CLAMPING ON CROSSRAIL

HD 16 20

STROJEXPORT

THE TABLE DRIVE

For the drive of the table a Ward-Leonard control is used with an infinitely variable speed regulation within a range of 1 : 10. This control system consists of a motor-generator for the generation of direct current, an exciter set and a variable speed motor-coupler to the driving mechanism of the table by means of a flexible coupling. This arrangement affords infinitely variable regulation of the motor-speed and, with it, of the table speed as well as reversal of the table in its end positions. This arrangement considerably reduces working times as compared to older methods of reversing drives with clutches. The central box-shaped part contains the main driving mechanism of the table. The gears for the transmission of motion to the rack of the table have helical teeth and ensure a smooth transmission of power. They are made of high-grade steel and cast steel. Gears for higher peripheral speeds are ground.



LUBRICATION

The table guideways are lubricated by an individual oil pump provided with an adjustment for oil pressure. Oil running off the guideways collects on the top surface of the bed and drains into sumps in the extensions at either end of the bed, and from there into the tank in the central box-shaped part of the bed, whence it is drawn by the pump, and once more delivered through a lamination type filter to the bedways. The gears of the table drive are also lubricated by an oil pump of their own. The rail-bearers on the crossrail and also the sideheads are lubricated with oil flowing by means of gravity or of wicks from oil containers.

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HD 16 20a

THE BED

consists of three parts: the longest central part and two end extensions. It is of a rigid lattice design, provided with heavy ribs and reinforced in the centre. The two prismatic guideways for the table are planed, ground and scraped if necessary.

THE TABLE

The cast iron table, which is heavily reinforced with ribs and of rigid construction consists, in cases of greater planing lengths, of two parts. The upper surface of the table has T-slots for clamping and holes for stops. The guideways of the table are lined with an artificial layer-forming material which protects them against seizing and substantially reduces wear of the bed. Oil wipers are arranged at either end of the table. A knife-type brake prevents the table from moving beyond the limits corresponding to the maximum travel and thus it increases the safety of the machine in operation.

THE HOUSINGS

are bolted to the table and form, together with the cross member, a perfectly rigid frame. The large cross section of the housings and the ribs ensure smooth action and reduce vibrations to a minimum. [illegible] housings are the guides for the crossrail and for the [illegible] sides of the housings guideways are arranged [illegible] position.

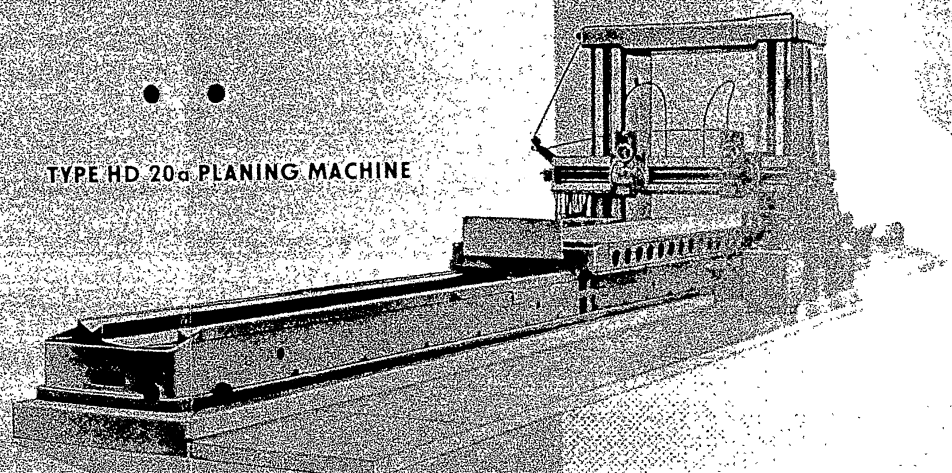
[illegible] MEMBER

[illegible] dimensions and reinforced with ribs, is fitted to the [illegible] of the housings. It joins the housings very rigidly and [illegible] never being distorted by the cutting resistances transferred [illegible] by the uprights and crossrail.

THE CROSSRAIL

is designed as a single heavy rail, the front part of which is provided with guideways for the rail heads. The rear part is optimally reinforced with ribs, which reduces distortions due to the cutting resistance to a minimum. The crossrail is automatically clamped to the housings by means of a hydraulic device arranged in the centre at the rear of the crossrail. Thus the cutting resistance is transmitted to the housings. The crossrail is vertically adjusted by means of a push button controlled rapid traverse.

TYPE HD 20a PLANING MACHINE



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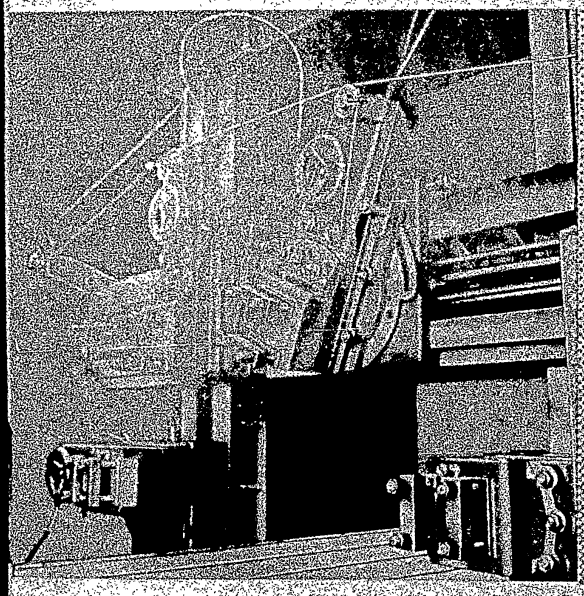
THE RAIL-HEADS

on the crossrail and the sideheads have hand and power feed and rapid traverse in horizontal and vertical direction. The sideheads have their own feed-box. The tool-head slides can be swivelled from their neutral positions through as much as 60° either way. The rail-head slides on the crossrail are balanced by means of a counterweight and a system of pulleys. This facilitates their adjustment by hand. The lifting of the tool-boxes is effected automatically hydraulically. The hydraulic feeds have two ranges with an infinitely variable adjustment, the ranges being 0 to 4 mm (5/32") and 0 to 20 mm (25/32") respectively per stroke of the table, with the sideheads from 0 to 10 mm (13/32").

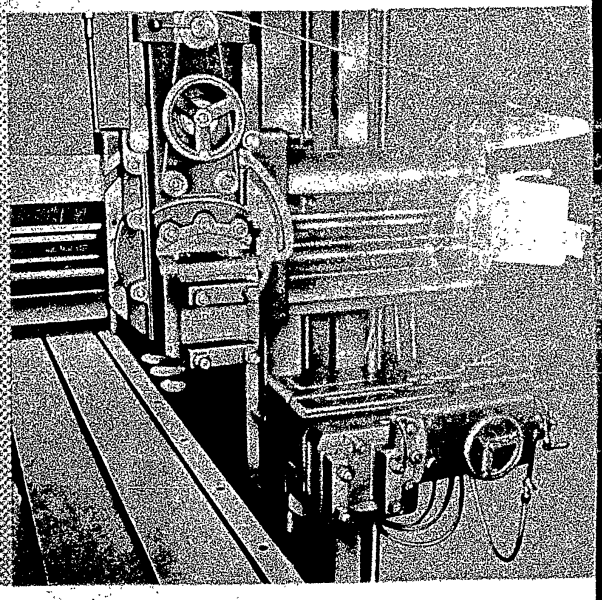
Both rail heads on the crossrail and both sideheads can either be operated independently or simultaneously. This second possibility contributes chiefly to a substantial reduction of machining times and eliminates frequent clamping of the machined part

THE FEED BOXES

are fitted at the right-hand side of the crossrail and on each sidehead. Each feed box contains a hydraulic feed cylinder and a motor for the rapid traverse. The direction of the rapid traverse is the same as that of the power feed. The gears of the feed box run in an oil bath.



VIEW OF CROSSRAIL. ONE RAILHEAD IS TILTED.



VIEW OF SIDEHEAD.

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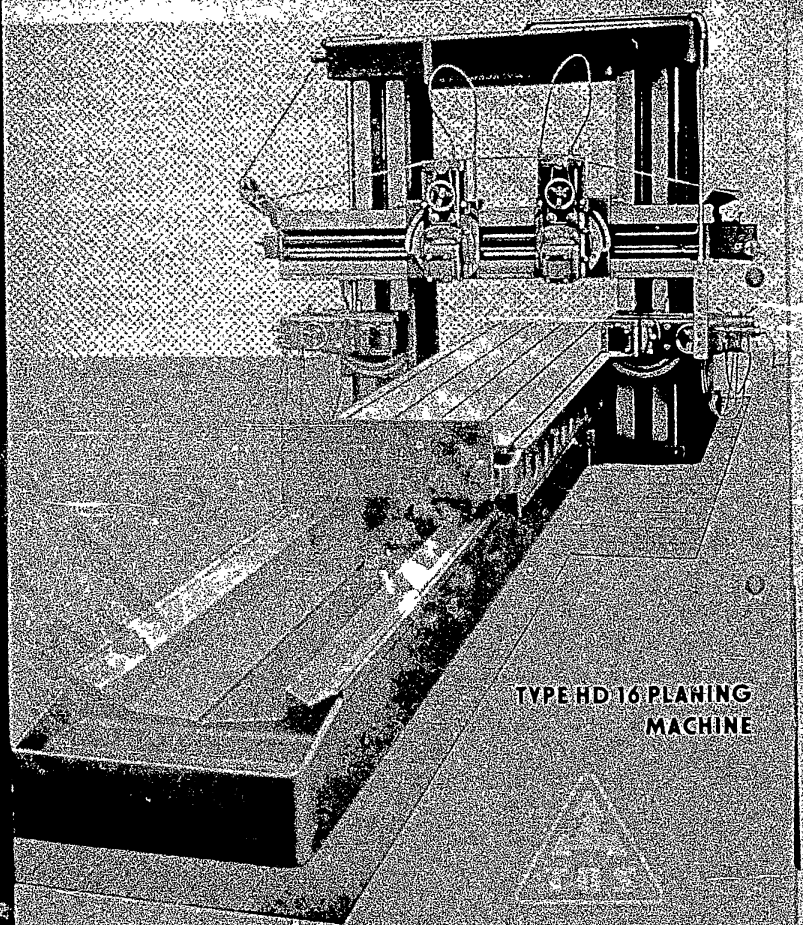
HD 16 20a



TYPE HD 16 PLANING MACHINE

HD 16 20a

STANDEXPORT

DOUBLE HOUSING PLANING MACHINES

are High Speed, Heavy Duty Machines of particularly rigid design which ensure a high grade of the machined surfaces even for the heaviest operations. The precision workmanship of the machines guarantees that the machined surfaces are precisely parallel and accurate within 0,01 mm. per 1 metre of planed length. The high capacity of the machine allows economical carbide tipped tools to be used, particularly for the machining of cast iron.

Types HD 16 and HD 20a Double Housing Planing machines are manufactured in two sizes, one with a planing width and height of 1,600 mm (64") designated the HD 16, and the second with a planing width and height of 2,000 mm (80") designated the HD 20a. Both sizes are available for various planing lengths of from 4,000 to 13,000 mm (13' to 41'). Machines built to a longer planing length permit several large objects to be machined simultaneously when clamped to the table in succession, which considerably cuts down the average working time necessary for the machining of one work piece.

The machines are supplied in three models having different maximum table speeds with an upper limit of 50, 63 or 80 metres (161, 207 or 263 feet) per minute.

The machines are normally equipped with two rail heads on the crossrail and a right- and a left-hand sidehead.

Outstanding features common to all models are the easy way of setting up the machines for any required job and ease of operation, rendering the machines economical both in single part manufacture and quantity production.

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HD 16 20a

SPECIFICATION

		Type HD 16	Type HD 20a
Planing width	mm	1,600 (63")	2,000 (78.7")
Planing length	mm	4,000 to 12,000	((13) of 40 feet)
Planing height	mm	1,600 (63")	2,000 (78.7")
Clamping surface of table (width × length)	mm	1,600×4,000-12,000	1,800×4,000-12,000
		(63"×13'-40'-1)	(71"×13'-40'-1)
Vertical movement of toolhead slide	mm	350 (13.8")	
Number of cutting and return speeds,		infinitely variable adjustment	
Model 1.			
Range of cutting and return speeds, approx. metres per min.	m/min	5—63 to 20—250 feet per min.	
Maximum drawing force	kg	9,500 (20,900 lbs)	
Input power of motor	HP	60	
Model 2.			
Range of cutting and return speeds, approx. metres per min.	m/min	5—63 to 20—250 feet per min.	
Maximum drawing force	kg	8,000 (17,600 lbs)	
Input power of motor	HP	40	
Model 3			
Range of cutting and return speeds, approx. metres per min.	m/min	5—63 to 20—250 feet per min.	
Maximum drawing force	kg	6,363 (13,900 lbs)	
Input power of motor	HP	40	
Feed per stroke	mm	0.25 to 20 0.01" to 0.8" per stroke	
Feed per stroke	mm	0.125 to 10 0.005" to 0.4" per stroke	
Maximum weight of workpiece			
per metre of length	kg	2,000	
per foot of length	lbs	1,340	
Weight of table	kg	5,500 (12,125 lbs)	
Power of main head	HP	4	
Power of side head	HP	4	
Power of crossrail	HP	1.5	
Machine with standard equipment (without planing length) approx.	kg	37,000 (81,600 lbs)	43,000 (95,000 lbs)
Weight per 1 metre of planing length approx.	kg	4,500	4,500
per 1 foot of planing length approx.	lbs	2,500	2,020
Weight of machine with accessories planing 4 to 12 m. planing length approx.	kg	47,000 (103,600 lbs)	60,000 (132,000 lbs)
Weight with accessories packing per extra metre of planing length approx.	kg	4,100	4,500
per extra foot of planing length approx.	lbs	2,750	3,250

When ordering, specify planing length, table speed, voltage, phase and frequency of power supply.

As improvement in design are continually being made, this specification is not to be regarded as existing in detail and dimensions are subject to alteration without notice.

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DOUBLE HOUSING PLANING MACHINES

HD 16 20a

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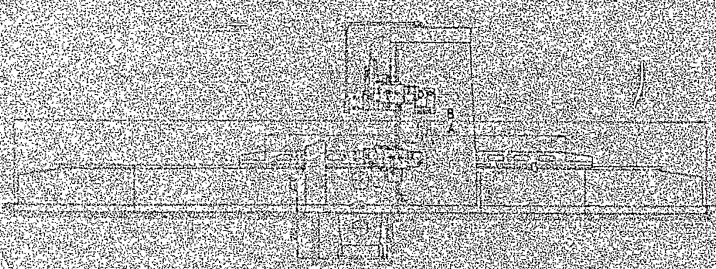
THE SIDEHEADS have independent feed and rapid traverse mechanisms. The control of the directions of feed is centralized in a single lever. The rapid traverse is engaged by means of a push-button on the swivelling box or on the control desk. The rate of feed is set independently of the rail heads.

The sideheads are balanced by counterweights, which facilitates manual as well as power operation and reduces the wear of the nut of the vertical screw to a minimum. The tool head as well as the sidehead slide are locked in their positions by means of tapered gibs which draw the slide and the head into the prismatic guideways all along their surface. Due to this arrangement the slide as well as the head resist heavy pressures in any direction and transmit them to the housing without any play. The tool head, which swivels 60° either way, has a dual attachment securing it to the sidehead slide. The tool head is provided with a hand wheel for accurate setting of the tool. The screw of the tool head runs in ball bearings and is provided with two nuts, one of which rotates and serves for eliminating end play. The tool head is provided with an automatic hydraulic tool lifter working equally efficiently in all positions of the tool head. It is returned to its cutting position by a spring. The tool lifter can be out of operation for internal planing. The tool head pin, around which the tool head swivels for the return movement of the table, is relieved of stresses and shocks caused during operation when the tool moves into the cut and is therefore not subject to wear. Due to this arrangement, accuracy is maintained even under the heaviest loads of the head. The tool does not bounce off when it strikes the work piece which increases the life of the cutting edge of the tool and improves the quality of the machined surface. The tool is clamped between grooved and hardened jaws.

THE TABLE DRIVE. The table is driven by an electric motor fed from a Ward-Leonard set and arranged below floor level. It is coupled to the driving pinion in the bed by means of a flexible coupling by which silent operation is achieved. The pinion as well as the other gears run in antifriction bearings. Particular care has been devoted to the design of the bearings of the gear engaging with the rack of the table. They are adjustable taper roller bearings. The arrangement of the driving motor below floor level enables the size of the gearing to be selected to ensure a long life and low stresses.

The main driving gear is in the centre of the bed and power is transmitted to it by a double helical gear. Thrusts are mutually balanced. Silent operation is guaranteed by careful machining and by a large number of teeth of the pinions. The drive is short and direct which reduces rotating masses to a minimum. This in turn reduces the current surges produced when the table is reversed. The motor has its own cooling system which draws air from the space inside the bed to which chips and other impurities have no access. The gears and anti-friction bearings are lubricated by means of an oil spray from an independent oil pump.

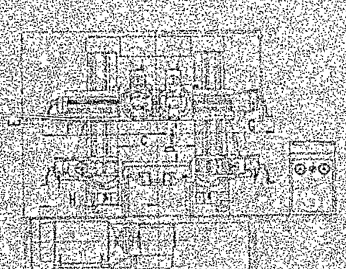


THE WARD-LEONARD SET. The wide range of speeds enables cemented carbide tipped tools to be taken advantage of, particularly for the machining of cast iron. The control of the movement of the table is centralized on the swivelling box and on the control desk. The swivelling box enables the machine to be operated from either operator's post. The cutting as well as return speed is infinitely variable by means of push-buttons from the control desk even during operation. A tachometer indicates the momentary speed of the table. The load produced by the cut being taken can also be continuously followed on the load indicator. Apart from the push-buttons for the cutting and return movements of the table and for stopping the table, the swivelling box and control desk also contain a push-button for low speed (about 3 metres or 10 feet per minute). This speed is used for observation of the machined surface and for indication.

THE LUBRICATION OF THE TABLE is arranged by means of an independent oil pump which ensures a uniform film of oil between the guiding surfaces and, as a result, a high degree of accuracy of the machined surface. The wipers at either end prevent impurities from penetrating between the sliding surfaces, which therefore keep their accuracy for a long time. Oil is supplied by an oil pump through an oil filter. Its quantity and pressure can be adjusted as required.

SAFEGUARDS OF THE TABLE. In view of its high speeds, the table is provided with a knee brake to prevent it from overrunning the bed in case the rack should get out of mesh with the main gear. Adjustable knives are fitted at either end of the bed and a ruler fitted to the table runs over these knives. The rulers are exchangeable. This brake is very efficient, yet it acts smoothly without harmful shocks.

A	B	C	D	E	F	G	H
3000—12000	8220—26220	1250	1250	2750	1500	1620	[illegible]



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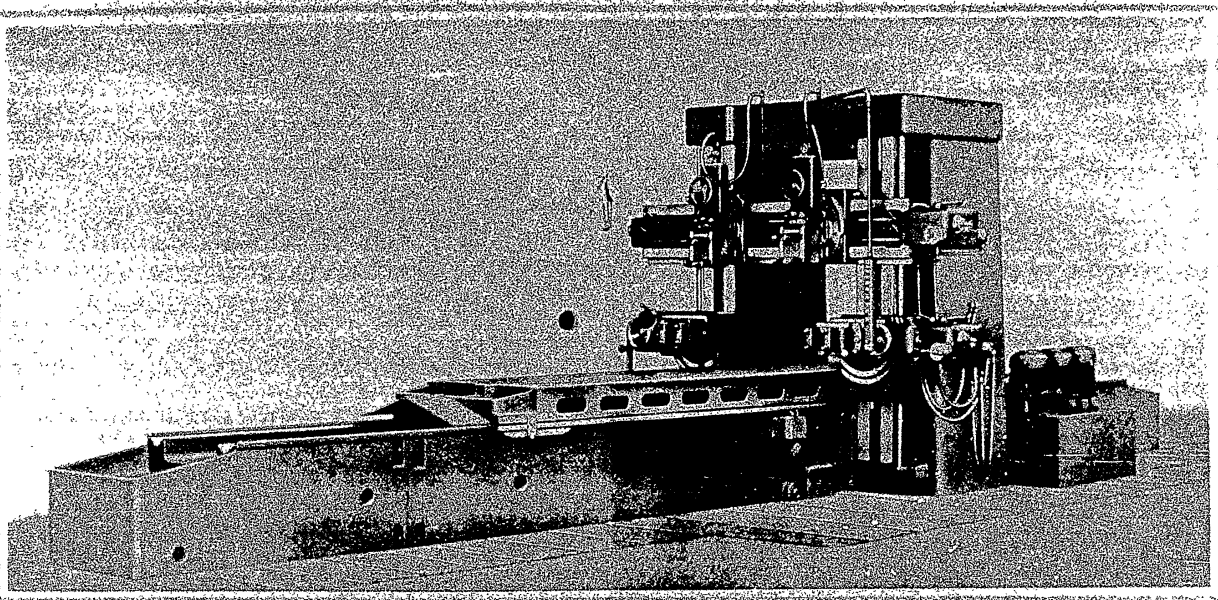

THE CROSS RAIL is of generous proportions, reinforced with a large number of ribs and its deep design has been chosen to resist the combined stresses produced during planing. The clamping of the cross rail is hydraulic and particularly sturdy so that the clamped cross rail forms with the housings a remarkably rigid carrier. The clamping force is easy to adjust.

The cross rail is raised and lowered by means of rapid traverse. The rapid traverse motor is fitted in the top cross member. The transmission to the elevating screws is arranged by means of a worm gear rotating in anti-friction bearings in an enclosed box with an oil bath. Special safety nuts are provided securing the cross rail in case of complete wear and stripping of threads of the elevating nuts. In the case of uneven wear of the elevating screws and nuts the horizontal position of the cross rail is adjusted by means of an adjustable coupling. A limit switch prevents the rapid traverse from moving the cross rail to its extreme position where it would hit the top cross member. The rapid traverse of the cross rail is interlocked with the clamping arrangement.

THE RAIL HEADS. The controls of the feeds and rapid traverse of both rail heads are arranged at the right-hand as well as the left-hand side of the machine. Each head has its own control rod running through the entire length of the cross rail with the appropriate distribution box behind the heads. There are sliding levers on the rod on either side of the head. All four directions of feed are controlled by means of a single lever. The distribution is arranged so that the selected direction of feed can be engaged immediately, irrespective of the momentary position of the corresponding gear. All the directions of rapid traverse are also controlled by means of this lever and the rapid traverse is engaged by means of push-buttons on the swivelling box or on the control desk. The selection of directions of feed of the two rail heads is mutually entirely independent. The accurate approach of the tool to the work piece controlled directly from the operator's position is facilitated by pawls on the heads. By means of the pawl the head can be moved horizontally as well as vertically, the appropriate direction of feed having been set beforehand by means of the control lever.

The rate of power feed of the heads is infinitely variable by hand by means of a hand crank even during operation of the machine. The rate set is indicated on a dial. One of two ranges, one covering low, the other one medium and high rates can be selected by means of a lever on the feed box. The double range affords accurate adjustment of the feed required which influences the quality of the machined surface and the accuracy of the dimensions of the machined object.

The feed and rapid traverse mechanism is protected against overload by a safety clutch.

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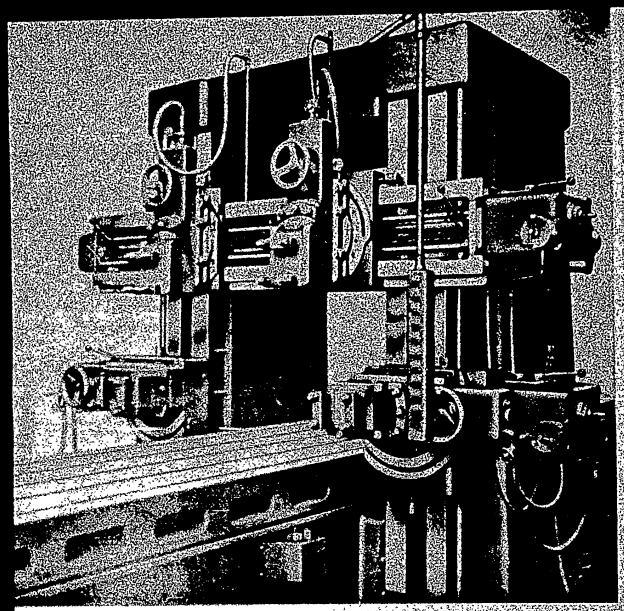

OUTSTANDING FEATURES

1. Wide choice of cutting or work speeds, infinitely variable
2. Simple and direct table drive efficiently transmitted over wide speed range
3. Rapid traverse in all directions of table and cross rail
4. Extra low speed for special operations, such as scraping or fine boring
5. Continuous checking of table speed and position
6. Simple and quick change of feeds, without interrupting the work
7. Hydraulic clamping of cross rail
8. Hydraulic and manual controls ready for selection and setting
9. Hydraulic lifting of tools at all points and retracting in any position of tool head
10. Rigidity of whole machine and high-grade workmanship permitting full utilization of cemented carbide tipped tools
11. Arrangement of table drive with motor below floor level, allowing the bed to be well anchored with ribs and cantilevered at ends of table only
12. Finishes produced by machining guideways of housings and of tool heads
13. Special locking of rail heads and tool heads enabling any position, particularly of tool heads even at highest outputs
14. Flexible coupling between main drive and feed alternating gearboxes
15. Control of movements of all railheads and slideheads by means of a single lever. Remote control of these movements permitting operation from either end of cross rail
16. Push-button control of machine arranged in swivelling box permitting operation from either side of machine
17. Knife-brakes protecting table from overrunning bed
18. Method of lubrication specially chosen to afford uniform lubrication at all speeds

HD12

DESCRIPTION

THE BED forms a strong and rigid box. Densely spaced ribs and strong walls reinforce the bed against all stresses and vibrations even at the highest cutting speeds and a full load of the bed. The central part of the bed has a higher cross section for attaching the housings which form a rigid unit with the bed. The bed rests with its entire length on the foundation. A double prismatic guideway ensures permanent accuracy in both planes even under the most difficult working conditions.

THE TABLE has a high cross section and is well reinforced with ribs both longitudinally and crosswise so that it forms a rigid unit even for the greatest planing lengths. The sliding surfaces of the table are lined with an artificial layer-forming material which protects them against seizing and reduces wear of the bed. The clamping surface of the table has a substantial allowance for wear and can be replaned repeatedly when worn. Deep T-slots and holes for stops afford universal clamping. An odd number of T-slots has been chosen for jigs and clamping fixtures. The pockets arranged at the ends of the table to stop chips from dropping on the bed can be extended and raised by means of sheet metal covers when high objects are being machined.

THE HOUSINGS are box shaped and have an almost square cross section. They are reinforced with densely spaced ribs, joined with the bed and the upper cross member; they form a strong and rigid unit resisting vibrations even at high speeds of machining.

THE FEED AND LIFTING OF TOOL HEADS are hydraulic. The movement of the distributing slide is synchronized with the movement of the table. The hydraulic oil tank with the pumps, pump motors, distributing slides and pressure reducing valves is arranged behind the right-hand housing. The pressure of the hydraulic fluid can be adjusted by means of the pressure reducing valves which are easily accessible.

The tool head pin, around which the tool head swivels for the return movement of the table, is relieved of stresses and shocks caused during operation when the tool strikes the work piece. The pin is not subject to any wear and the tool head operates with a minimum of play even when the load of the machine is at its maximum. The tool does not bounce on when it strikes the work piece. This increases the life of the cutting edge of the tool and improves the quality of the machined surface. The tool, which is subjected to shocks and considerable stresses, is clamped between grooved and hardened jaws.

The automatic hydraulic tool lifter works equally efficiently in all positions of the tool head. The lifting of the tool can be stopped by pushing in a pin which locks the tool head in position. After completion of the return movement the tool head is returned to its cutting position by a spring which can also be cut out of operation by turning a knob when it is necessary to lift the tool by hand.

The tool head as well as the tool slide are locked in their position by tapered locking gibs which draw the slide and the head into the prismatic guideways all along their surfaces. The tool head, which swivels for either way has a dual attachment securing it to the head slide bed. It is provided with a hand wheel for accurate setting of the tool. The hand wheel can easily be reached even in the higher positions of the head. The screw of the tool slide runs in ball bearings without any end play. It is provided with two nuts, one of which rotates and serves for eliminating backlash. The lubrication of the whole tool head is centralized so as to simplify attendance.

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HD12

SPECIFICATION:

Planing width	mm	1250	50
Planing length	mm	3000 to 12.000	10 to 40 feet
Planing height	mm	1250	50
Clamping surface of table (width × length)	mm	1100 × 3000—12.000	44" × 10'—40'
Vertical movement of tool slide	mm	250	10
Number of cutting and return speeds		infinitely variable	

MODEL 1.:

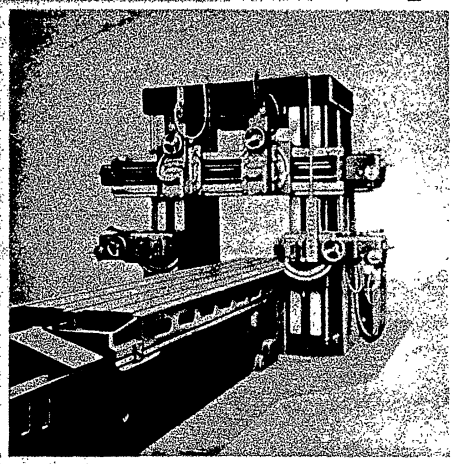
Range of cutting and return speeds, approx. metres per min.		3—5 to 50	10—16 to 164 feet per min.
Maximum drawing force	kg	10000	22000 lbs.
Input power of motor	HP	60	

MODEL 2.:

Range of cutting and return speeds, approx. metres per min.		3—4.3 to 63	10—21 to 207 feet per min.
Maximum drawing force	kg	8000	17600 lbs.
Input power of motor	HP	60	

MODEL 3.:

Range of cutting and return speeds, approx. metres per min.		3—8 to 80	10—26 to 263 feet per min.
Maximum drawing force	kg	6300	13900 lbs.
Input power of motor	HP	60	
Cleavage feeds	mm per stroke	0.25 to 20	0.01" to 0.8" per stroke
Tool slide feeds	mm per stroke	0.125 to 10	0.005" to 0.4" per stroke
Input power of rapid traverse motor of cross rail	HP	3	
Input power of rapid traverse motor of heads	HP	1	
Maximum loading of table by workpiece per metre of planing length	kg	1000	2200 lbs.
Maximum load per head	kg	3500	7700 lbs.
Weight of machine with standard accessories (3000 mm—9'10" planing length) approx.	kg	22000	48500 lbs.
Weight per extra metre of planing length approx.	kg	2500	5500 lbs.
Weight of machine with seaworthy packing (3000 mm—9'10" planing length) approx.	kg	27000	59500 lbs.
Weight with seaworthy packing per extra metre of planing length,	kg	2900	6400 lbs.
[illegible] packing (boxes) 3000 mm—9'10" [illegible] approx.	cubic metres	29	
	cubic feet	1024	
[illegible] extra metre of planing length	cubic metres	3.2	
[illegible] of planing length	cubic feet	35	



STANDARD EQUIPMENT:

Two rail heads, one right-hand sidehead, driven by means of Ward-Leonard set consisting of main electric motor, D. C. generator direct coupled to three phase slip-ring electric motor for connecting to three phase power mains, an immersed rotor starter, controlling elements including exciter (amplidyne), protective switch, distribution box, control desk and swivelling control box, (panel) and operator's instruction booklet.

OPTIONAL EQUIPMENT:

Left-hand sidehead with automatic tool lifting device and hydraulic mechanism. Grinding attachment.

WHEN ORDERING, SPECIFY PLANING LENGTH, TABLE SPEED, AND VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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DOUBLE HOUSING PLANING MACHINES

HD12

are High Speed, Heavy Duty machines of particularly rigid design which ensure a high grade of machined surfaces even for the heaviest operations. The precise workmanship of the machines guarantees that machined surfaces are accurately parallel and true within 0.01 mm per 1 metre of planed length. The high capacity of the machine allows cemented carbide tipped tools to be used, particularly for the machining of cast iron.

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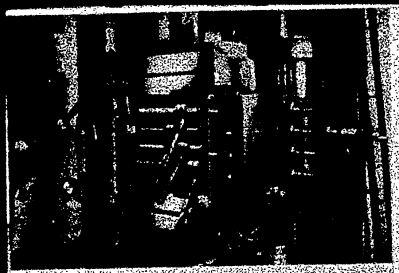
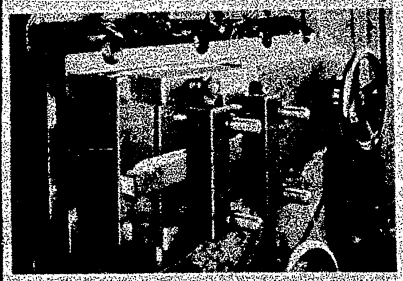
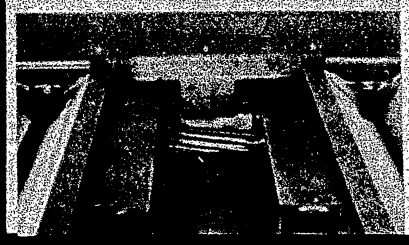






The Table travels in two prismatic guideways. The guideways of the table are lined with a layer forming material which protects the table from seizing and reduces wear of the bed. The upper surface of the table is provided with T-slots for clamping the work-piece and with holes for the stops. Pockets arranged at the end of the table stop the chips from dropping on the bed. They can be made longer and higher by means of sheet metal extensions. The ends of the guideways of the table are fitted with wipers which do not allow impurities to enter between the sliding surfaces.

Lubrication. The table is lubricated by an electric motor driven pump which delivers the oil through lamination type oil cleaners to the table guideways. The lubricating oil is pushed in front of the wipers and washes impurities off the guideways of the bed. The quantity and pressure of the lubricating oil can be varied by means of control valves. Another pump lubricates the gears of the drive by means of a stream of oil.

The Rail Heads are provided with a hydraulically operated power feed and with a horizontal, vertical and, if necessary, angular rapid traverse operated from the feed boxes which are driven by independent electric motors. Each rail head has its own feed box. For the hand feed of the rail heads ratchets are provided which move along the lead screws and feed shafts of the heads. The tool slides are balanced by counter-weights. The rigid design of the rail heads affords the possibility of using cemented carbide-tipped tools and of planing special shapes.

The Side Heads are guided in the housings in wide guideways and are balanced by counterweights arranged inside the housings. Each side head is provided with a feed and rapid traverse in any direction operated from the feed box. The direction of the feed and of the rapid traverse can be selected from the panel or from the control desk. The lifting of the tool box is hydraulic.

The Feed Boxes operate all the feeds of the individual tool heads. The hydraulic power feed is operated by a piston and the rate of feed is varied by altering the stroke of the piston. The electric motors for the rapid traverse are fitted directly on the feed boxes.

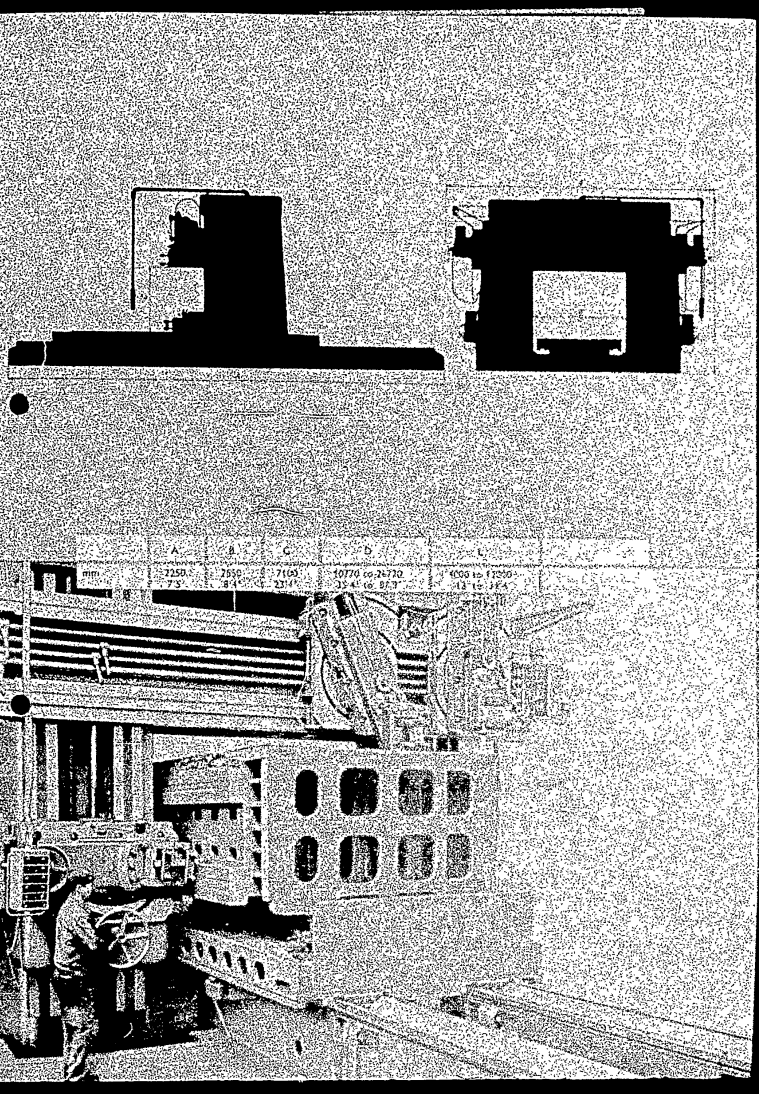
The Operation of the machine is simple and all movements of individual assemblies can be remote controlled by push-buttons from the swivelling panel or control desk. The Ward-Leonard set is started and the table speed is controlled from the control desk on which also all the controls and measuring instruments are fitted. The tool heads and cross rail are centrally lubricated by means of hand lubricators. The automatic movements of the tool heads are safeguarded to avoid damage to the machine due to incorrect operation.

Standard Equipment

2 railheads
Side head, right hand
Side head, left hand
Electrical equipment including Ward-Leonard set and auxiliary motors (without connections between planing machine and Ward-Leonard set)
Set of spanners and cranks for operation
Operating instructions

Optional Equipment

Lighting



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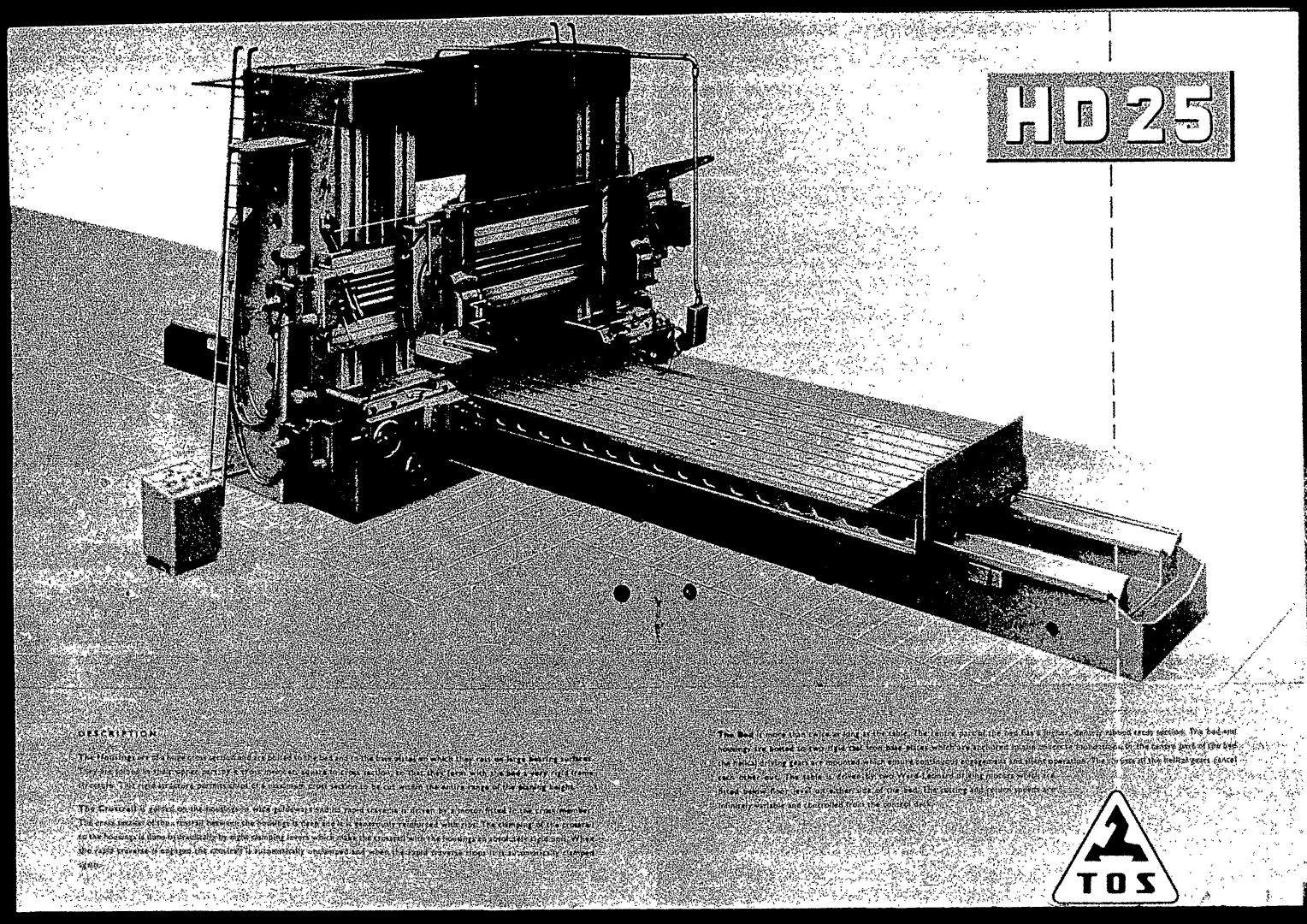

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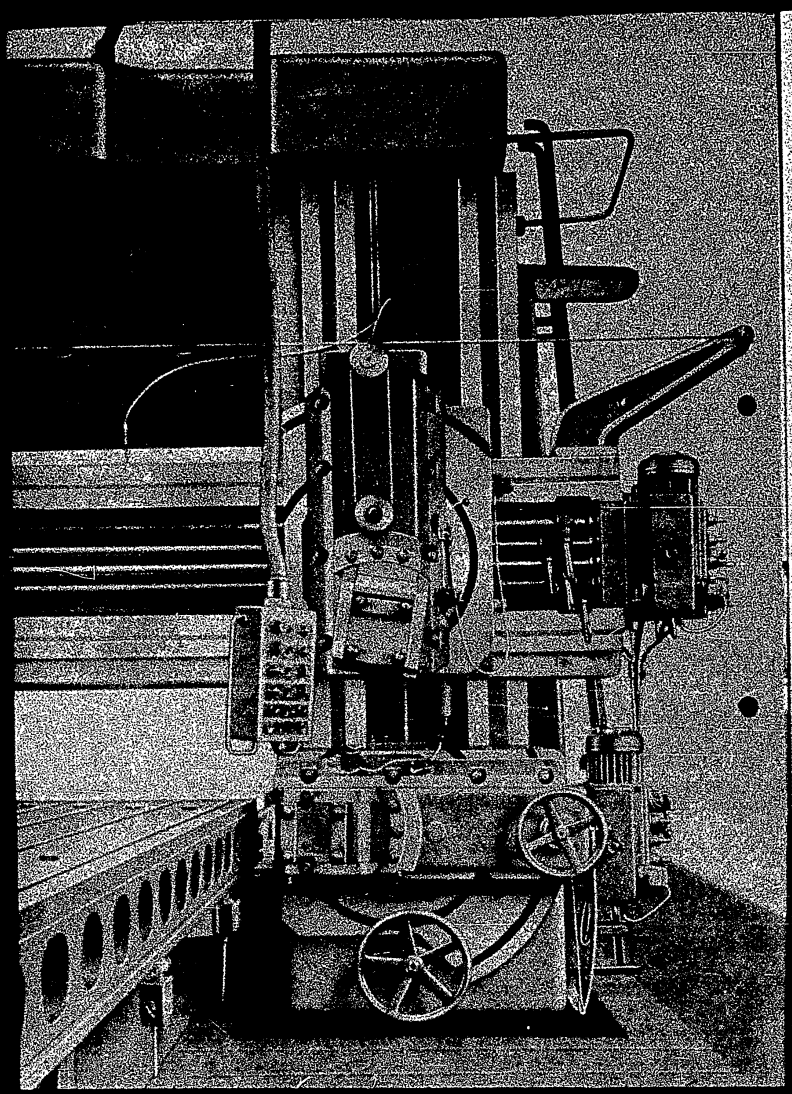

TYPE HD 25 DOUBLE HOUSING PLANING MACHINE

HD25

The machine is intended for the planing of horizontal, vertical and angular surfaces. It is designed to meet the latest requirements of modern manufacturing technology and is marked by perfect rigidity, remote control, high cutting and return speeds with means of infinite variation and a high drawing force.

OUTSTANDING FEATURES

1. High range of cutting and return speeds infinitely variable even during operation of machine.
2. Controls of machine centralized in swivelling panel and in control desk.
3. Remote selection of direction of feed and of rapid traverse.
4. Possibility of rapid movement of workpiece toward tool by means of rapid travel of table.
5. Guideways of table lined with artificial layer-forming material which prevents seizing and considerably reduces wear of bed.
6. Table secured against movement beyond permissible limits on bed by knife-type brakes.
7. Centre part of machine resting on cast iron plates. This arrangement increases rigidity and allows easy adjustment of machine to required accuracy.
8. Automatic clamping of crossrail.
9. Hydraulic feeds of all tool heads in either direction with rate of feed variable even while planing is in progress.
10. Particularly low speed of table for measurement and observation engaged by merely depressing push button.
11. Independent adjustable lubrication of guideways of table.
12. Continuous check on speed and load of machine.
13. Main motors of drive so located as not to increase floor space occupied by machine.
14. High rigidity of machine and high drawing force permit utilization of cemented carbide-tipped tools and planing of special shapes.

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SPECIFICATION

Planing width	mm	2500	8'2"
Planing height	mm	2000	6'6"
Planing length	metres	4, 6, 8, 10, 12	13' 1½", 19' 8", 26' 3", 32' 9", 39' 4"
Clamping surface of table (width × length)	mm	2250 × 4000 × 12000	7'3" × 13' 1" × 39' 4"
Width and distance between T-slots	mm	320; 360	12⅝"; 14⅛"
Infinitely variable cutting and return speeds per minute:			
Model I: range	metres	3.6—63—63	11'10"—207'—207'
Model II: range	metres	4.5—80—80	14'9"—262'—262'
Maximum drawing force:			
Model I	kg	15000	34650 lbs
Model II	kg	10000	22050 lbs
Rail head feeds, per stroke	mm	0.5 to 30	0.021" to 1.2"
Side head feeds, per stroke	mm	0.4 to 24	0.16" to 0.96"
Feeds of tool slide on rail head, per stroke	mm	0.33 to 15	0.013" to 0.6"
Feeds of tool slide on side head, per stroke	mm	0.2 to 12	0.008" to 0.48"
Travel of tool slide on rail head	mm	480	19"
Travel of tool slide on side head	mm	180	7"
Input of motors of machine:			
Model I	HP	114	
Model II	HP	116	
Input of motor for rapid travel of crossrail	HP	15	
Input of motors for rapid travel of tool heads	HP	3	
Input of pressure oil pump motors	HP	3	
Input of lubricating oil pump motor	HP	0.5	
Input of motor for automatic control	HP	0.12	
Maximum load of table by workpiece per metre of planing length:			
at speeds of 6.3 to 20 metres per min.	kg	12000	
at speeds of 20 to 40 metres per min.	kg	6500	
at speeds of 40 to 80 metres per min.	kg	3500	
per foot of planing length:			
at speeds of 20'8" to 65'8" per min.			8070 lbs
at speeds of 65'8" to 131'4" per min.			4370 lbs
at speeds of 131'4" to 262' per min.			2350 lbs
Maximum load on 1 tool head with tool slide moved forward 200 mm (8")	kg	8000	17600 lbs
Maximum planing length up to speed of 40 metres (131'4") per min. in either direction	mm	1000	3'3"
Total input of electrical equipment of machine	kW	200	
Floor space required by machine	mm	7100 × 10770 to 16770	23'4" × 35'4" to 47'4"
Weight of machine with standard equipment (8000 mm — 26' 3" planing length), approx.	kg	140000	308700 lbs
Weight per metre of planing length, approx.	kg	5800	3900 lbs
Weights per foot of planing length, approx.			

IN ORDERING, SPECIFY VOLTAGE, PHASE, AND FREQUENCY OF POWER SUPPLY

As improvements in design are continually being made, all above data and illustrations are not to be regarded as binding in detail and dimensions are subject to alteration without notice.

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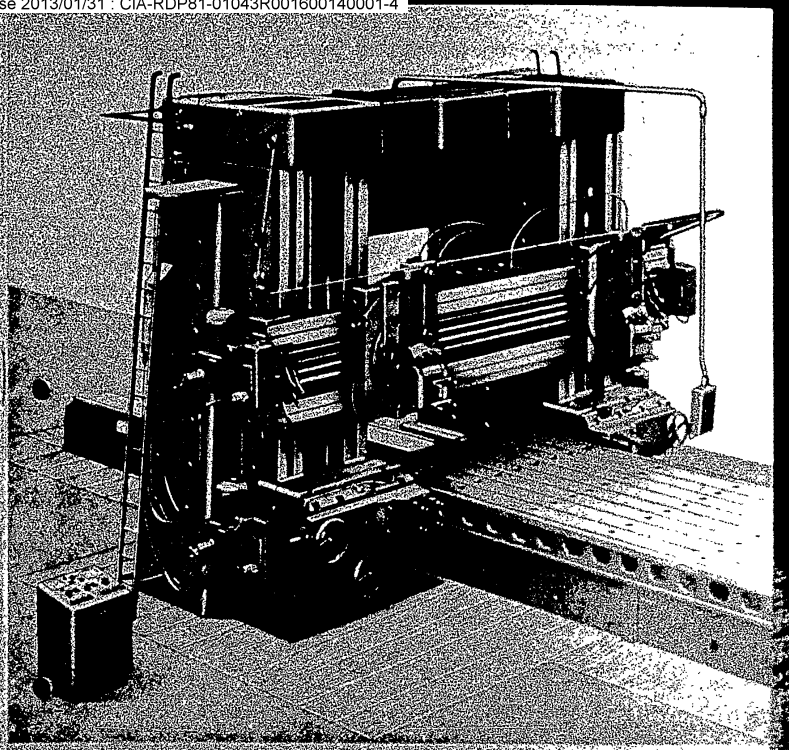

DOUBLE HOUSING PLANING MACHINE

HD 25

COK 5284a-5109

Printed in Czechoslovakia

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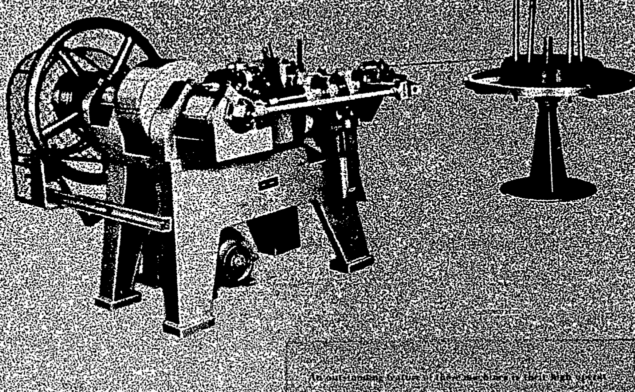


An outstanding feature of these machines is their high operating efficiency over a long period of time even under the most severe conditions, which makes them ideal for the modern production methods.

DESIGN. The unusually heavy construction and ingenious design of all parts subject to strain or wear ensure long life and high output. The main frame as well as the other parts are of very liberal dimensions to withstand high stresses. Particular attention has been paid to the selection of high quality material and accurate workmanship. Principally all savings have been made by improving the design, and by no means to the detriment of the quality or reliability of service.

MAIN DRIVE. The controlling mechanism is mounted on both sides on two auxiliary shafts so that the clenching of the point cutters with each other is eliminated. The crankshaft rotates in 4 bearings and is counter balanced by a weight to obtain a quiet and uniform running and thus to increase the life of machine. The gripping dies sliding in long guides are operated by eccentrics. Bronze-bushed bearings are used throughout excepting the rolls which rotate on needle bearings to prevent seizing and to reduce wear to a minimum. All stationary parts have central system of lubrication, only the movable parts being provided with standard oil cups.

WIRE FEEDING DEVICE. The wire feed drive is by a link mechanism. The length of nails is easily adjusted by a set screw. The feeding die is lifted at its return stroke so that the wire is not rubbed off by the sharp edge of the tool and the tool does not become blunt. The wire feed may be stopped by means of a handle while the machine is in operation.

TOOLS. The tools are within easy reach of the operator and may readily be changed. The heading hammer is firmly held in an adjustable toolholder and securely locked to prevent its loosening during the operation. The box-type gripping die is a novelty which, by its indexing feature, permits to reestablish 11 times the gripping profile without changing the punch. Thus considerable time savings are obtained.

EJECTOR. To prevent the nails from rebounding beyond the chute the machine is equipped with an ejector which knocks down the finished nails into the chute. The ejector is situated underneath the header slide. Another ejector operating from above is provided for removing the burr which may be produced by blunt point cutters.

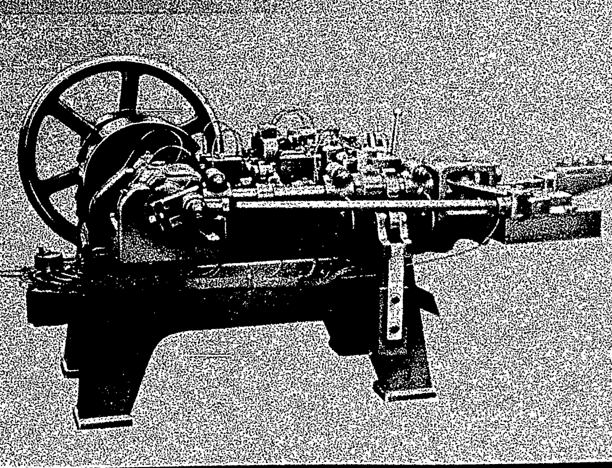
STANDARD EQUIPMENT: 1 heading hammer
1 gripping die (11-fold)
Point cutters
Grease gun
Operator's instruction booklet

OPTIONAL EQUIPMENT: Reel jack

The tools must of course be changed for every nail diameter and therefore when ordering it is always necessary to send a sample or a detailed sketch of the nails to be made.

The machines are supplied with a fast and loose pulleys. If desired and at an extra charge they can be arranged for individual motor drive.

LHA



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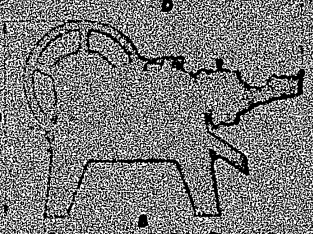
SPECIFICATIONS

Model		LHA 50	LHA 70	LHA 110
Number of nails per minute approx.		500	400	350
Capacity: Diameter of wire approx.	mm	1.5 – 2.2	1.8 – 3.1	2.2 – 3.8
Length of nail approx.	mm	10 – 50	15 – 70	15 – 110
Required belt drive	HP	1	2	3
Speed of pulley	r.p.m.	500	400	350
Net weight approx.	kg	150	800	1400
Overall dimensions approx.	mm	1025 × 1070 × 1210	1100 × 1100 × 1600	1160 × 1620 × 2150
Size of box approx.	mm	1230 × 1210 × 1250	1300 × 1600 × 1650	1400 × 1900 × 1800

	A	B	C	D	E
LHA 50	540 13,3"	600 23,6"	1070 42"	1010 39,8"	1035 40,8"
LHA 70	560 17,48"	850 33,47"	1380 54,3"	1550 61,5"	1085 42,8"
LHA 110	700 27,5"	1250 49"	1630 63,6"	2250 87,8"	1160 45,6"



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With a view to the continuous improvement of our products the technical data and illustrations do not always comply with the latest design so that they are not binding in details and weights.

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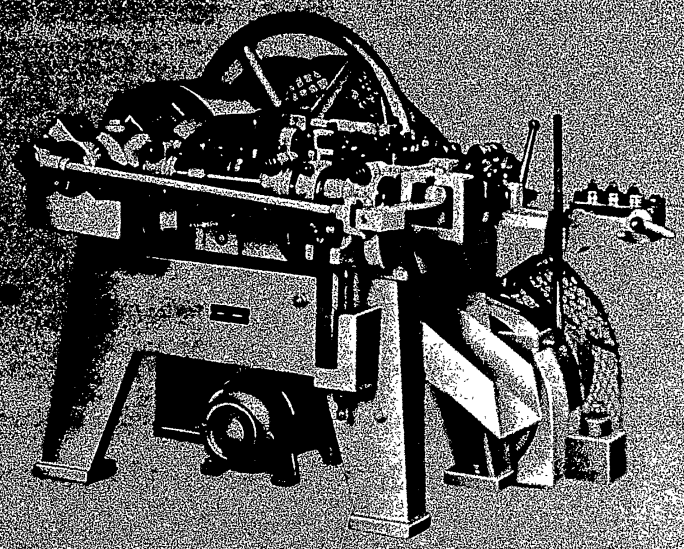

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● HIGH-SPEED WIRE NAIL MACHINES Models

LHA 50 70 110

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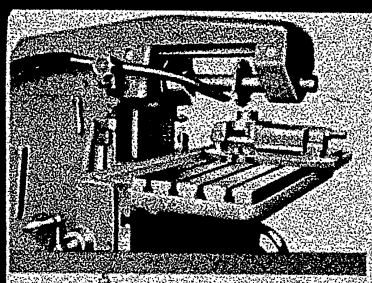
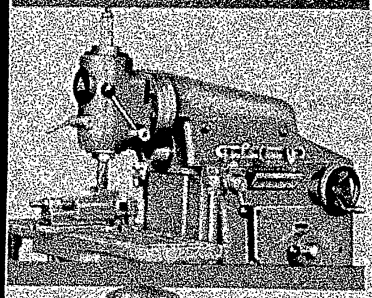
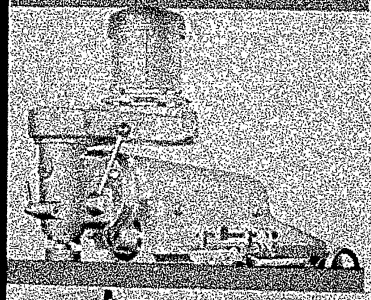
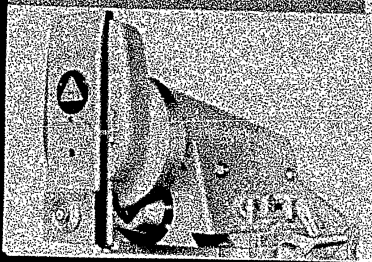








Overarm

When work is being done with the horizontal headstock and with a tool remove from the spindle, the milling arbour can be supported by its front end being held in the arbour support bearing of the overarm.

Distance front end of spindle to arbour support bearing	mm	177	7"
Distance centre line of spindle to bottom surface of overarm	mm	60	2⅜"
Weight	kg	33	73 lbs

Vertical Milling Attachment

This attachment is intended for vertical milling work. It is driven by the horizontal spindle. The head can be turned to any angle in a vertical plane. The spindle is adjustable for height.

Spindle taper, number		16
Spindle speeds, number		6
range	r.p.m.	40 to 2000
Power is taken by		Vic A Morse
Vertical movement of spindle	mm	97
Swivel of attachment		0 to 360°
Weight	kg	96

High Speed Milling Attachment

This attachment covers flexible milling and drilling with tools of small diameter. The spindle is driven by an own electric motor by means of a V-belt with three step flat pulley.

Spindle speeds, number		3
	r.p.m.	2150
		4000
		5000
Vertical movement of spindle	mm	65
Swivel of attachment		0 to 180°
Chuck capacity		10
Number of collets		12
Overall dimensions	mm	310 x 95 x 440
Weight	kg	59

Slotting Attachment

This attachment is intended for slotting work. The ram is driven by the horizontal spindle. For heavier work only one to two strokes per minute are applied. The ram stroke is adjustable.

Number of strokes per minute		60 to 90
Stroke	mm	0 to 90
Number of speeds		2
Power of attachment		¼ hp
Weight	kg	42

Fixed Table

Clamping surface	mm	220 x 540
T-slots, number		3
width	mm	12
spacing	mm	50

Tilting Table

The clamping surface of this table can be swivelled to any position within the range stated below.

Clamping surface	mm	260 dia.
T-slots, number		5
width	mm	12
spacing	mm	50
Swivel of table around horizontal axis perpendicular to axis of vertical table, to either side to an angle of		45°
Tilting of table around a horizontal axis parallel with the surface of the vertical table, to either side to an angle of		90°
Rotation around a vertical axis to either side to an angle of		45°
Weight	kg	76

Circular Table

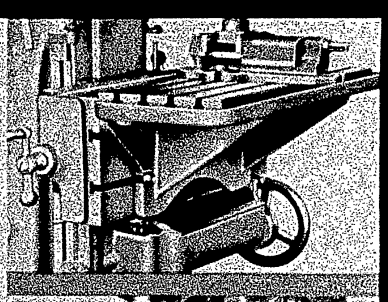
This table is intended for circular milling. It also permits direct as well as indirect index-ing.

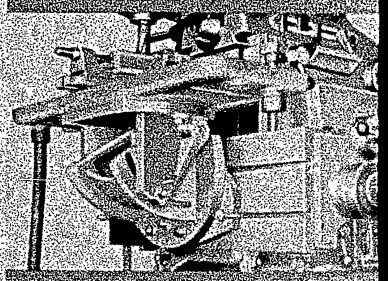
Diameter of clamping surface	mm	300
T-slots, number		3
width	mm	12
spacing	mm	50
Indexing: Range for direct in-dexing		2 to 24
Number of discs for direct indexing		3
Weight	kg	51

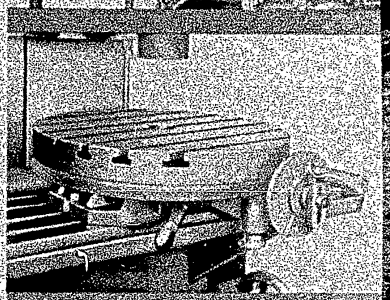
Dividing Attachment

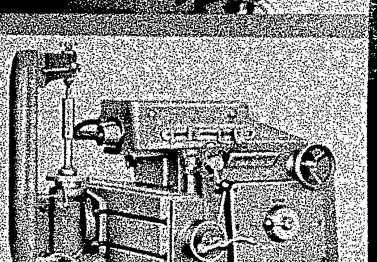
This attachment serves for direct and indirect dividing in a range not always stated below. The spindle of this attachment can be inclined in a plane perpendicular to the surface of the table as well as in a parallel one with the ranges stated below.

Distance between centre of swivel of spindle from vertical direction lowered machine-slide		220
Inclination of spindle from vertical direction lowered machine-slide to an angle of		11°
Swivel of spindle away from machine-slide to an angle of		10°
In vertical plane parallel with vertical table in either case to an angle of		90°
On the attachment direct dividing is possible in the following range of		2 to 24
Number of discs for indirect dividing		3
Weight	kg	60









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CONTROLS

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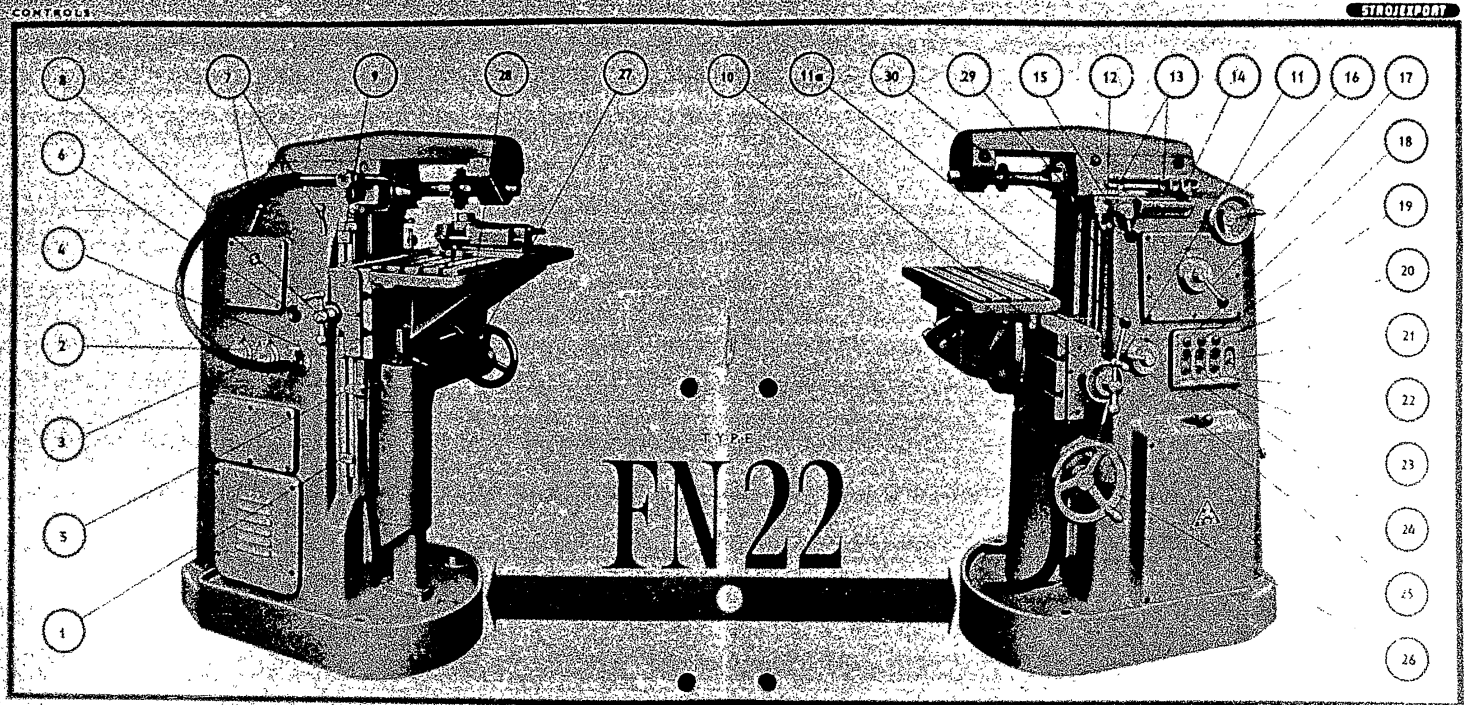

1. Bottom Stop of Vertical Table Feed
2. Socket for Plug of High Speed Milling Attachment Motor
3. Light Socket
4. Coolant Control Valve
5. Handle for Locking of Knee
6. Oil Level Gauge
7. Handle for Locking of Headstock in Position
8. Hand Crank of Longitudinal Feed
9. Stop Screw of Vertical Table Feed
10. Hand Crank of Longitudinal Table Feed
11. Lever for Changing Feeds of Knee
11a. Feed Clutch Lever
12. Scale with Vernier for Cross Feed of Headstock
13. Stop of Longitudinal Feed of Headstock
14. Indicator Holder
15. Lever for Engagement of Cross Feed of Headstock
16. Hand Wheel for Cross Feed of Headstock
17. Spindle Speed Change Lever
18. Signal Light of Main Motor
19. Signal Light of High Speed Milling Attachment
20. Signal Light of Cooling Systems
21. Light Switch
22. Push-Buttons for Starting and Stopping of Electric Motor Driven Pump
23. Push-Buttons for Starting and Stopping of High Speed Attachment Motor
24. Push Buttons for Starting and Stopping of Main Motor
25. Lever of Main Motor Pole-Changing and Reversing Switch
26. Hand Wheel of Vertical Feed
27. Indicator Holder
28. Scale with Vernier for Longitudinal Feed of Table
29. Indicator Holder
30. Scale with Vernier for Vertical Feed of Table

TOS

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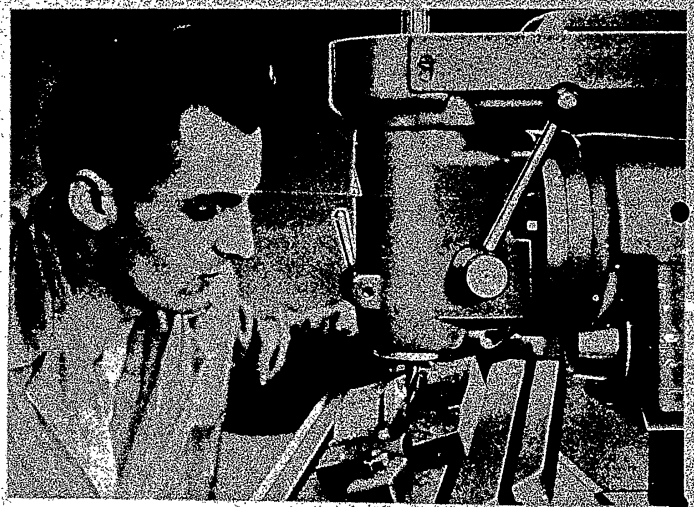
UNIVERSAL TOOL MAKER'S MILLING MACHINE Type

FN22



This highly versatile machine is intended for the milling of irregular shaped tools, dies, metal patterns and gauges. It is indispensable in tool rooms and it gives to good advantage in the manufacture of machinery parts which are simple in size, but of intricate shape.

The following operations can be done on the machine:

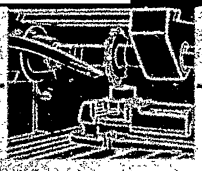
- Horizontal milling
- Vertical milling
- Various milling and drilling by means of high speed attachment
- Circular milling

The dividing worksheath and the indexing equipment of the circular table facilitate milling operations which require dividing.

The swivelling table prepares sloping surfaces to be milled under any angle.

The easy setting of the machine and the clear layout of the controls contribute to operating economy also in single piece production or multiple production in small batches.

The precision workmanship of the machine ensures a high degree of accuracy such as is demanded in the manufacture of tools and machinery parts.



DESCRIPTION

The basic design of the machine is of horizontal milling machine with a vertical table. The headstock with the horizontal spindle has a hand feed and a power feed. The power feed has 18 different rates ranging from 8 to 500 mm (5/16" to 19 11/16") per minute. The automatic disengagement of the feed is operated by adjustable stops. The well designed mounting of the spindle in specially accurate anti-friction bearings ensures a high precision of the shape and dimensions of the surfaces being machined.

The wide range of spindle speeds, viz. 40 to 2000 r.p.m. in both directions of rotation arranged in 16 steps, permits a suitable cutting speed to be selected for any currently used material with any tungsten or high-grade steel.

The base and the vertical table on which clamps & bars or drilling jigs, etc. can be clamped, are provided with longitudinal and vertical hand and power feed. A total of 18 different rates of feed ranging from 8 to 500 mm (5/16" to 19 11/16") per minute is available in either direction. The power feed in either direction can be limited by reversing stops.

The easy changing of both the spindle speeds and the power feeds contributes to the simplicity of operation and thus helps the rapid rise of economy in single production as well as in multiple production in small batches.

The machine is driven by a motor attached to a hinged plate which permits the tension of the belt up be adjusted. The bar of the feed box is fitted with a lever for easy operation.

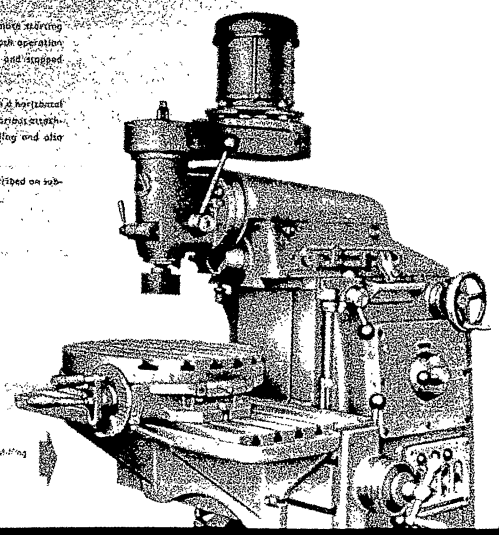
The well designed lubricating system of the machine ensures a long operating life of the machine and a minimum wear of parts.

The machine is equipped with a cooling equipment consisting of an electric motor driven pump, a delivery piping and a discharge piping.

The rotator electrical equipment with remote starting and with protective relays safeguards smooth operation even if the individual motors are started and stopped frequently.

Apart from the basic design of machine with a horizontal headstock the machine can be adapted, by various attachments and equipment, to all kinds of milling and also drilling and slotting operations.

All the attachments and equipment are described on subsequent pages of this prospectus.



Type FN 22 Milling Machine with high speed milling Attachment and Circular Table Fitted

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SPECIFICATION

Clamping surface of vertical table	mm	220 × 640	8 11/16" × 25 1/4"
Tables of vertical table: number		7	
width	mm	12	11/16"
spacing	mm	90	3 11/16"
Longitudinal travel of table	mm	270	10 5/8"
Vertical travel of table	mm	300	11 3/4"
Longitudinal power feeds of table: number		19	
range, per minute	mm	8 to 500	5/16" to 19 3/4"
Vertical power feeds of table: number		19	
range, per minute	mm	8 to 500	5/16" to 19 3/4"
Taper in horizontal spindle		No. 4 Morse	
Spindle speeds: number		18	
range	r.p.m.	40 to 2000	
Cross travel of headstock	mm	150	5 1/2"
Power feeds of headstock: number		19	
range, per minute	mm	8 to 500	5/16" to 19 3/4"
Main electric motor, speeds	r.p.m.	1400/2800	
output	kW	1.9/2.1	
Height of centre-line of spindle above foundation	mm	1250	4'1"
Dimensions of machine: height (without equipment)	mm	1345	4'5"
width (extreme position of table)	mm	1290	4'3"
length	mm	940	3'1"
Weight of machine	kg	830	1830 lbs

Standard Equipment

Front table, swing table, circular table, vertical milling attachment, high speed milling attachment, slotting attachment, dividing attachment, overarm, set of spanners, grease gun, operating instructions.

Optional Equipment

Spotlight.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS

The particulars in the prospectus are not binding in detail.

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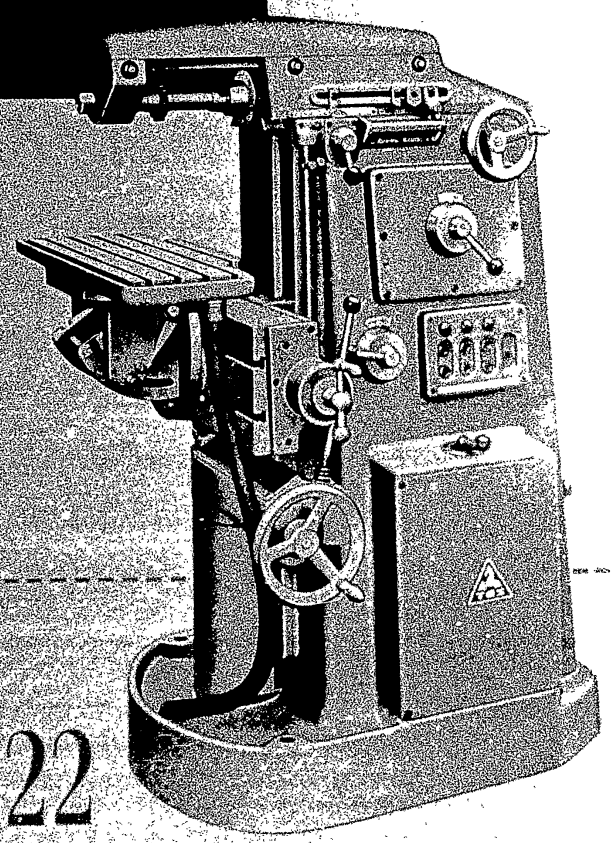

FN 22

UNIVERSAL TOOL MAKER'S MILLING MACHINE

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Hydraulic Injection Moulding Press
Type CBS 45-1

CBS 45-1

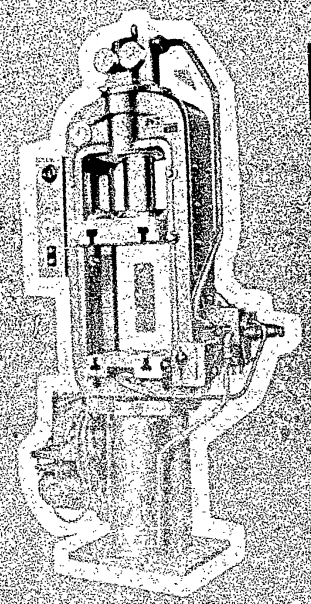
This press is intended for the production of smaller and medium size mouldings of thermosets, such as bakelite and carbamide substances, of rubber, etc. by injection from the pressure chamber into heated moulds as well as by hydraulic stamping. The injection moulding technique is used whenever the mouldings must have a guaranteed uniformly hardened material and also for complicated mouldings with large differences in the thickness of walls, for mouldings with many metal insertions, etc. The press is of vertical design, with top closing and bottom injection. The injection piston can be put out of operation and the press may then be used for ordinary moulding. The operation of the press is controlled by a two-way distributor. The pump is fitted on the frame of the press which forms the tank of the low-pressure liquid. The press is fitted with instruments for automatic temperature control of the mould and of the heated injection head.

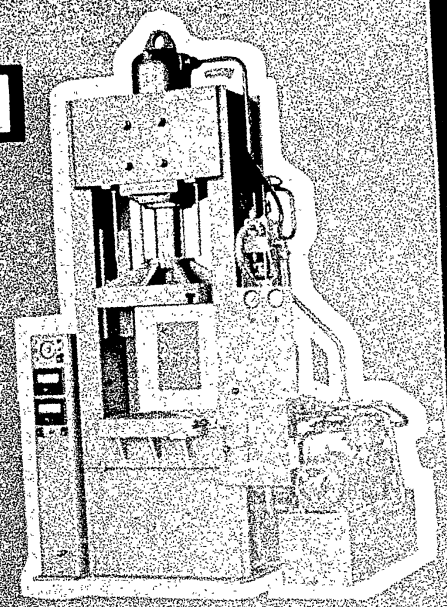
Type CBS 175-1
Hydraulic Injection Moulding Press

CBS 175-1

This press serves for the treatment of thermosets, such as bakelite and carbamide substances, of rubber and other substances by injection into heated moulds. It is intended for the manufacture of heavy thick-walled mouldings requiring homogeneous material, mouldings with considerable differences in the thickness of walls or with complicated cores, moulds with numerous metal insertions, etc. The production time is considerably reduced by injection moulding.

The press is of vertical design and forms a self-contained machine unit with its own electric motor driven pump. It is provided with top closing of the mould and central bottom injection perpendicular to the parting line of the mould. The closing and injection forces are variable within wide limits. The operation of the press is controlled by a distribution assembly which is operated by two levers and the press can also operate semi-automatically with a clockwork opening the mould automatically when the set working period has elapsed. The temperature of the mould and of the heated injection head is maintained at the required figure by automatic control equipment.





Specification

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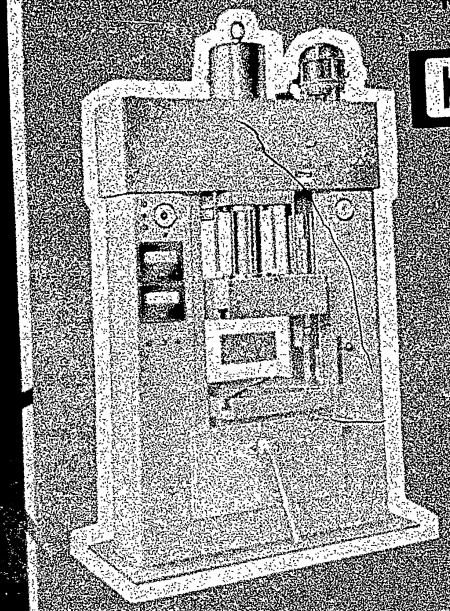
Types CBJ 60-1 CBJ 100-1 and CBJ 150-1
Hydraulic Presses

CBJ100-1



are heavy duty machines of medium size and of modern, advanced design intended for the treatment of thermosets such as bakelite, carbamide and melamine substances, India-rubber, celluloid and similar substances as well as rubber in heated moulds.

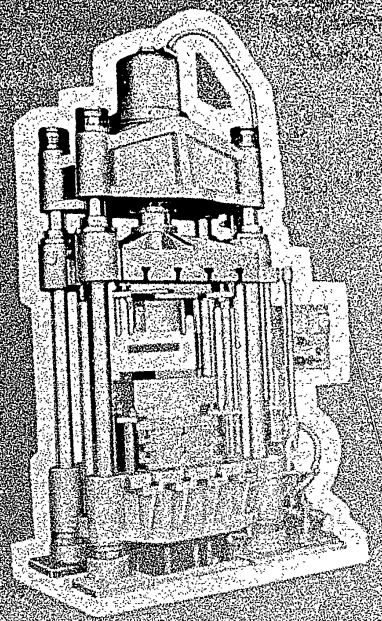
These presses are also used for other purposes than the production of objects of plastics, e. g. for working sheet metal, wood, ceramic materials, etc. They may be equipped with heated or, if required, cooled, multi-deck plates.

The presses are of top-pressure design with a built-in two-pressure pump of their own, driven by an electric motor. The economical operation of the press is facilitated by a rapid closing of moulds at low pressure and moulding proper at high pressure. The movement of the moulding platen is controlled by hand by a simple lever, or semi-automatically by means of a timer. This permits several presses to be operated by a single operator. The mouldings are ejected from the moulds either by a hand lever or automatically by a short pull rod. The temperature of the moulds is controlled by reliable automatic instruments.

Specification

Types CBJ 250-1 and CBJ 500-1
Hydraulic Presses

CBJ 250-1



are intended for the production of large and deep mouldings of thermosets such as bakelite, carbamide substances, India-rubber, rubber, and other substances which can be shaped by moulding. These presses are of vertical top-pressure design, with automatic bottom ejector of mouldings, with the possibility of using top ejection. The working cycle is controlled by a distributor operated by a single pedal. The moulding pressure is adjustable within a wide range. The speed of the platen can be adjusted in any position and the movement of the moulding platen can be slowed down automatically or by hand before the mould closes and while it opens.

The moulding period can be set by a clock-work which controls indirectly and automatically the distributors so that the press then operates semi-automatically. The two-pressure pump of special design is arranged separately from the press.

Specification

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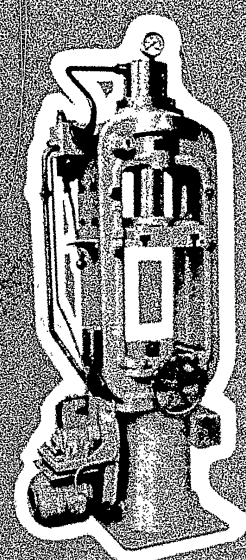
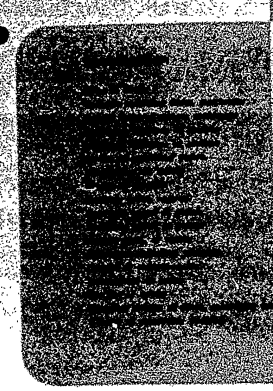
Type CBJ 45-1 Hydraulic Presses

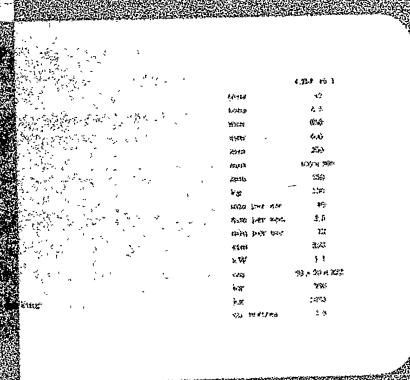
CBJ 45-1

These are the smallest presses for the production of objects moulded of thermoplastics such as bakelite, carbamide, melamine, horn and celluloid, India-rubber, natural and synthetic rubber and similar substances, in heated moulds. They are suitable for repetition work as well as for laboratory applications and may be used to advantage also for other work than the processing of plastics.

The presses are of vertical, top-pressure design and have a three-piston high pressure pump of their own driven by an electric motor. The built-in low pressure accumulator affords a quick closing of the moulds. The operation of these presses is highly economical with a minimum consumption of electric power. The presses are controlled simply, yet sensitively by a single hand lever. The presses are fitted with a mechanical bottom ejector of mouldings operated by a hand wheel.







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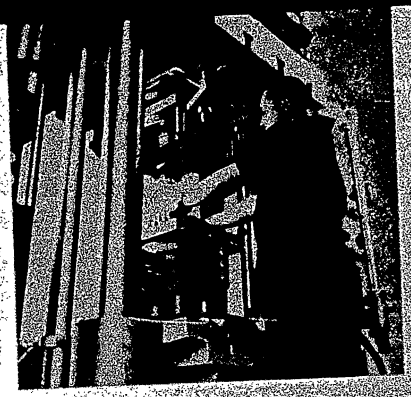
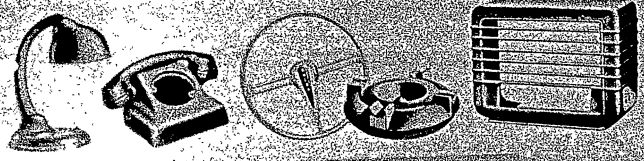




HYDRAULIC SEMI-AUTOMATIC PLASTIC MOULDING PRESSES

Models GB 250 and GB 500

The machines are used for the manufacture of large ... ...ber and linings of hard ... rubber and ... materials suitable for moulding.

The machines are of the four-column type with overhead ... ejection and a device for opening the upper platen. They outstanding features are large stroke ... between platens. The working cycle is ... by a single foot lever operated distributor. The ... is variable within wide limits. The speed of ... platen may easily be adjusted in any position. ... moulding time is automatically timed by an ... controlling the distributor. The machine is easily operated ... from by an unskilled worker.

THE WORKING TABLE

... with the lower cross-beam and is fitted with slots for clamping the lower mould half. ... contains ejectors and the bottom ejecting mechanism.

THE CLAMP PLATEN

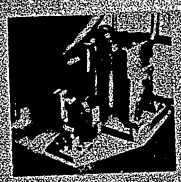
... is heavily reinforced and provided with slots for clamping the upper mould half. It is guided on the ... columns by means of bronze bushed bearings.

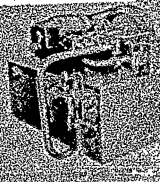
THE CYLINDER

... is mounted in the upper cross-beam and is accurately ground to ensure long life of the piston packings. ... The top ejectors may be mounted into the respective openings in the cylinder. Four columns connect the upper and lower cross-beam forming at the same time the frame of the press and the guides for the clamp platen. The head of the piston is provided with bronze guides and with jaw rings.

THE EJECTING MECHANISM

... is controlled by the upper clamp platen through draw rods enabling change of stroke and ... The ejectors are returned to their bottom position by means of the ejecting mechanism.





THE HYDRAULIC DOUBLE PRESSURE POWER UNIT Model RPZ 9

... is located outside the machine. Its gear pump supplies low pressure oil for the quick ... of the clamp platen. The piston pump supplies high pressure oil for the proper moulding ... The pumps are regulated and discharged hydraulically and automatically.

THE CONTROL

... is effected hydraulically by a distributor with 3 valves controlled by means of a single foot lever ... The speed of the escape of air from the mould and to prevent any damage to the moulding at the ... The delay may be regulated. After the working cycle has ... the clamp platen can be delayed. The delay may be regulated. After the working cycle has ... the automatic opening of the press is accomplished by an automatic locking device ... relay on which the working time is set. As a result, the machine operates semi-automatically ... may be cut out when desired.

THERMAL REGULATION

... The moulds are heated to the working temperature electrically or by other means and ... held at this temperature by means of thermostats and mercury relays.

STANDARD EQUIPMENT:

... with pressure gauge, pressure control valve and switch-off mechanism, piping ... with ... electromagnetic locking device, set of spanners, 3 sets of spare packings, operator's instruction ...

OPTIONAL EQUIPMENT:

... power unit RPZ 9 with container, electric motor starter panel and V belts ... should be ordered ... with the machine), thermal regulation devices (thermostats, mercury relays) ... motor switch ... ejector, ejecting ... always state the kind and data of heating energy for one mould half ... heat insulating ... plates for moulds.

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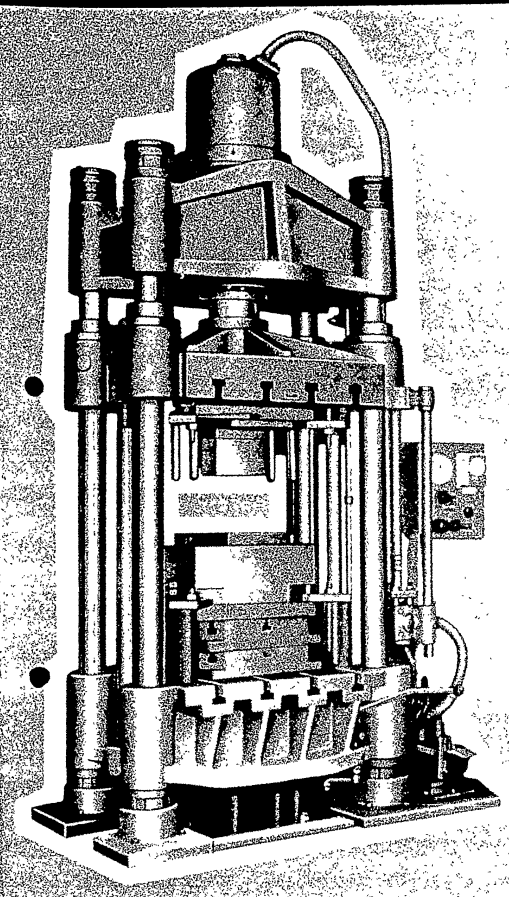
Specifications

Specifications of hydraulic double-pressure power unit RPZ 9

Instructions for pressing



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HYDRAULIC SEMI-AUTOMATIC PLASTIC MOULDING PRESSES FOR BAKELITE MODELS LB 250 - LB 500

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DESCRIPTION

The frame of the press is enclosed, welded of rolled sections and steel sheet. The cabinet on the left hand side of the press contains the electrical equipment.

The pump is placed at the right hand side, fitted to the operating oil tank, as well as the electric motor driving the pump and the pressure oil distributor with the valve mechanism. In the tank the oil cleaner is fitted for removing impurities. The filter can be taken out easily without the contents of the tank being drained. The upper cast iron platen is pressed by the piston and secured by a nut locked by a screw. It is provided with a ram which catches any oil which may escape through leaks in the stuffing box. The guides in adjustable grooved malic guideways of soft cast iron and provided with diagonal oil slots for clamping the upper part of the mould to the lower one, four table is bolted to the frame of the press and has clamping slots identical with those of the upper platen. A rod for the ejection of mouldings passes through the centre of the table.

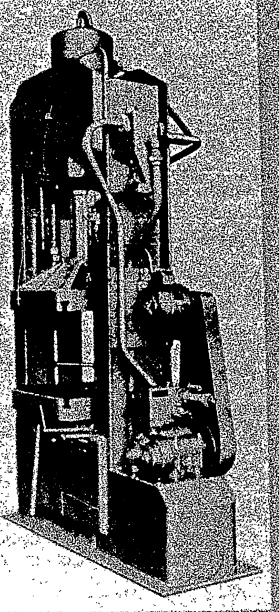
The forged moulding cylinder is built into the top part of the press.

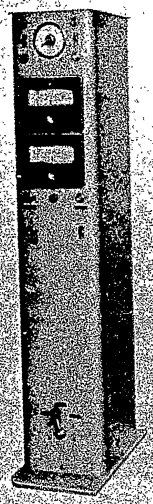
The moulding piston is sealed by means of a collar made of oil-resisting material. The head of the piston is sealed by a collar against the moulding space and the withdrawing space.

The operation of the press is controlled by a valve distributor. The valves are operated by a hand lever. The press cannot be started unless a safety lever is simultaneously depressed by the operator's left hand. This affords protection against injuries.

The semi-automatic operation of the press is controlled by an electromagnetic equipment with a type KZeb time relay. The time necessary for the hardening of the moulding during exposure, the equipment changes the direction of the piston withdrawal and, at the same time, starts the pump so that the press is opened. The time value can be set within a range of 0½ to 3 minutes. The automatic opening of the press can be cut out of operation by switching off a switch. If a worn or compressed mouldings are being moulded which require cores to be removed, etc. before the mould is opened. The top position of the moulding platen can be set as required by a stop on the pull rod. The automatic opening of the press simplifies operation and permits mouldings to be produced quickly and at a uniform rate.

The press is driven by a two-stage pump. The low pressure part is formed by a gear pump which supplies a large quantity of oil. While the plates pump runs at a high speed at no load. The piston pump then increases the oil pressure to the figure required for the moulding process. The change-over from the low pressure, which has a constant upper limit, to the high pressure and vice versa is done by a slide valve. The high pressure is infinitely variable within a range of 50 to 160 kp. of the maximum pressure. As soon as the pressure reaches the set figure the pump is cut out automatically and continues to run at no load.





The mouldings are ejected from the upper half of the mould by ejectors which pass through the platen as it approaches its top position. The ejection from the lower half can be done either mechanically or by hand.

The automatic temperature control of the moulds with which the press is equipped consists of two falling-off-zero type temperature regulators and an iron-constantan thermocouple which is attached to the mould by means of terminals (thermocouples). One regulator controls the upper half of the mould, the other the lower half.

Standard Equipment

Pump with electric motor, push-button starting and thermal overload protection, pressure gauge, time relay, and electromagnetic cam, automatic temperature control of moulds with falling-off-zero type regulators, set of moulding tools, set of packings, operating instructions.

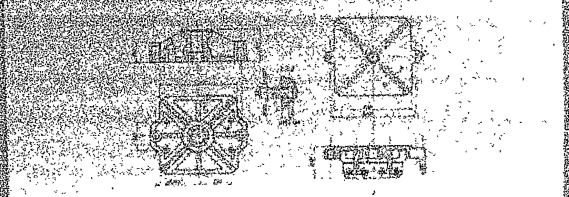
Special Equipment

Operating oil required for filling, further spare packings, spare parts, insulating plates under moulding mating plates for moulds.

Front and Rear View of Electrical Equipment Cabinet of the Press.

Hydraulic Heating Upper Moulding Platen. *Dependent Opening of Moulding Table*

(Dimensions in millimetres)



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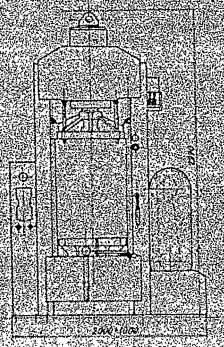
SPECIFICATION

Maximum moulding force	kN	1500	1500	1500
Working stroke, max.	mm	400	400	400
Stroke of beam	mm	800	800	800
Opening	mm	1100	1100	1100
Daylight	mm	1500	1500	1500
Dimensions of table (mm)	mm	1100 × 1100	1100 × 1100	1100 × 1100
Maximum force of ejecting cylinder (bottom beam of mould)	kN	150	150	150
Speed of working stroke of beam, approx.	mm/sec	150	150	150
Speed of return stroke of beam, approx.	mm/sec	250	250	250
Speed of ejecting cylinder, approx.	mm/sec	150	150	150
Speed of return stroke of ejecting cylinder, approx.	mm/sec	250	250	250
Pressure of working liquid, max.	kg/cm²	250	250	250
Pressure of working liquid, operating	kg/cm²	200	200	200
Pressure of working liquid, low pressure	kg/cm²	50	50	50
Pressure of working liquid, high pressure	kg/cm²	200	200	200
Capacity of pump at low pressure	l/min	90	90	90
Capacity of pump at high pressure	l/min	6	6	6
Capacity of pump, low pressure	mm³/rev.	90	90	90
Capacity of pump, high pressure	mm³/rev.	6	6	6
Pump: Type				
Diameter	mm	210	210	210
Stroke	mm	150	150	150
Capacity	litres per min.	90	90	90
Speed	r.p.m.	500	500	500
Pressure, max.	kg/cm²	250	250	250
Electric motor: Type				
Output	kW	30	30	30
Speed	r.p.m.	1500	1500	1500
Electric motor: Make (Czechoslovak)				
Diameter of platen: operating oil	mm	1000	1000	1000
Diameter of platen: cooling oil	mm	1000	1000	1000
Connected load capacity	kW	30	30	30
Electric motor: Make (Czechoslovak)				
Diameter of platen	mm	1000	1000	1000
Approx. dimensions of press	mm	1500×2500	1500×2500	1500×2500
Weight of press with standard equipment	kg	6500	6500	6500
Shipping weight of press, approx.	kg	6100	6100	6100

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTOR.

The machines are continuously being improved, so that the data given in this prospectus are liable to change without notice.



Dimensional Drawing of the Press (Dimensions in millimetres)

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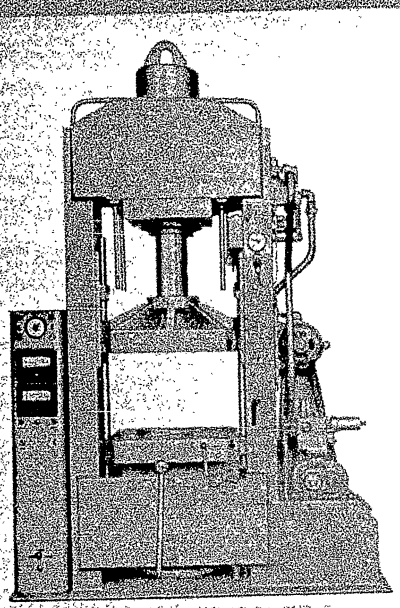

TYPE GBJ 150 HYDRAULIC PRESS

LB 150-3

This press is particularly suitable for the manufacture of mouldings of heat-hardening substances (thermosets), such as carbamides, melamines, phenol-formaldehydes, rubber, etc., in heated moulds.

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The press is of vertical, top pressure design and is driven by a motor driven pump. The frame of the press is of welded steel plates and rolled sections. An auxiliary hand-press is fitted in the top cross-head bar.

The piston of the press is provided with a screw for rapid vertical adjustment. The stroke of the piston can be read on the scale of the guide rod. Rapid withdrawal of the piston is effected by very powerful springs.

The working table can be adjusted for height in a wide range. It is locked in the working position by steel pins. At the front of the table a centering device is arranged for the testing of pipes to be straightened, either between centers or on V-blocks. Bars or pipes, the length of which exceeds the longitudinal clear width, can be straightened on the press, provided their diameter is smaller than the transverse clear width. The press is driven by a Type RPZ 1 motor driven pump.

The type RPZ 1 motor driven pump has two stages of pressure. The lower pressure stage is a gear pump and supplies a large quantity of oil at a pressure of up to 10 atm. (140 psi.) for a rapid approach of the piston of the press at no load. After that only the piston part operates which supplies a small quantity of oil at a pressure of up to 200 atm. (2200 psi.). The high pressure can be adjusted by a controlling safety device.

STANDARD EQUIPMENT

Lever operated distributor, hand operated mechanical press, 2 V-blocks for support of shafts during straightening, centering device, pressure gauge, set of spanners, a sets of spare packings, operating instructions.

OPTIONAL EQUIPMENT

Type RPZ 1 motor driven pump, connecting piping between press and pump.

SPECIFICATION

Force of press	tons	50	
Maximum operating pressure	atm.	200	1200 psi
Stroke of press piston	mm	180	7 in.
Vertical adjustment of screw	mm	200	7 7/8"
Vertical adjustment of table	mm	500	19 5/8"
Maximum opening	mm	900	35 "
Minimum opening	mm	180	7 in.
Longitudinal clear width between columns	mm	760	30 1/2"
Transverse clear width between columns	mm	420	16 1/2"
Maximum force of hand operated mechanical press	tons	5	11 000 lbs.
Maximum stroke of hand operated mechanical press	mm	300	11 3/4"
Throat of hand operated mechanical press	mm	160	7 1/2"
Weight of press, net, without pump	kg	860	1900 lbs.
Weight of type RPZ 1 motor driven pump, net	kg	100	220 lbs.
Overall dimensions without pump, with hand press	mm	1650×1600×2380	65"×63"×110"
Overall dimensions of type RPZ 1 pump	mm	450×450×480	19"×19"×19"
Output of electric motor of type RPZ 1 pump	kW	0.3	0.4 HP
Quantity of oil supplied by type RPZ 1 pump up to 200 atm (2200 psi.) per minute	litres	1.4	0.3 Imp. gallons

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RP 1 and RP 6 Hydraulic Double-Pressure Power Units

The RP units are used for driving various types of hydraulic presses, especially the presses for the [illegible] of bearings for driving hydraulic bending presses arranged in batteries or for driving the [illegible] of presses [illegible] hand.

The units consist of a low-pressure and a high-pressure accumulator and of a pressure pump with [illegible] high-pressure accumulator without interruption. Thus an immediate supply of a large quantity [illegible]

GENERAL DESCRIPTION

The low-pressure accumulator of the vertical type is welded to the base [illegible] of the [illegible] The low-pressure valve. The pump is situated at the top. A funnel for filling the vessel with operating [illegible] Valve is provided for filling the accumulator with compressed nitrogen or in case of necessity with air. The pressure of a pressure gauge.

The high-pressure accumulator is a vertical type steel bottle which is welded to the body of the [illegible] The high-pressure accumulator is provided with an automatic pressure valve which does not allow the pressure in the accumulators to drop below a [illegible] The high-pressure valve is situated on another pressure valve.

The plunger pump is driven by V-belts from the electric motor. Both the pump and the motor are fixed to the [illegible] The crank case is made of a steel sheet to eliminate porosity and leakage. The pump cylinder is made of fine cast iron with removable cover. It is provided with an oil level gauge. The crankshaft which is made [illegible] roller bearings. The connecting rods are also mounted on roller bearings. The cast iron crosshead is [illegible] with a self-adjusting piston head transmitting the pressure from the connecting rod to the piston which is [illegible]

The pressure oil is sucked by the pump from the low-pressure accumulator and delivered into the high-pressure [illegible] cylinder. A pressure of 200 atm. (2200 psi.) is ready for operation. The pump is equipped with [illegible] which automatically stops the pump when the desired pressure is reached, so that the engine runs idle. [illegible] a safety valve.

STANDARD EQUIPMENT

Electric motor, [illegible] with [illegible] type, [illegible] ordered), 2 pulleys with V-belts, 2 pressure [illegible] spanners, 2 sets of spare packings, 1 instruction booklet.

OPTIONAL EQUIPMENT (only on special order of an extra charge)

Connecting pipes between the power unit and the press, low-pressure and high-pressure [illegible] connected to the power unit.

CAUTION: NEVER TRY TO FILL THE ACCUMULATOR WITH OXYGEN! DANGER OF EXPLOSION!

SPECIFICATIONS

		RP 1	
Number of liquid supplied	litres	27	6.05 gallons
Maximum working pressure	atm.	150	2.205 lbs. per sq. in.
Pressure of low-pressure accumulator	atm.	7	100 lbs. per sq. in.
Number of pump plungers		6	3
Power of motor	kW	12	16 HP
Capacity of low-pressure accumulator	l	60	13.2 gallons
Capacity of high-pressure accumulator	l	24	5.3 gallons
Net weight of power unit	kg	360	792 lbs.
Shipping weight of power unit	kg	385	847 lbs.
Dimensions of power unit	cm	155 × 80 × 120	61" × 31" × 47"
Dimensions of packing, gross capacity	cm	170 × 95 × 145	67" × 37" × 57"

Operating liquid: A mixture of pure water with 3 % of SHELL ANTICORROSION [illegible]

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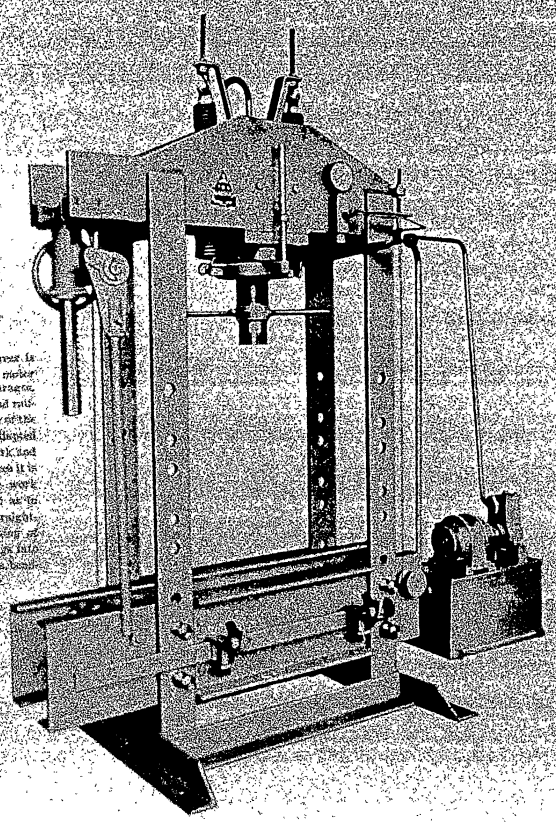
STROJEXPORT

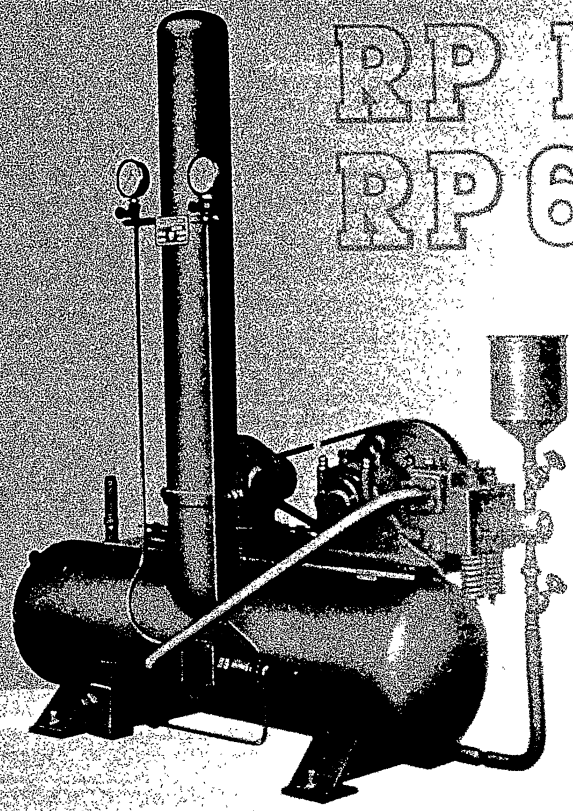
TYPE CDM 80-1 HYDRAULIC PRESS (LD 80)



This assembly shop press is intended primarily for motor vehicle repair shops, garages, general repair shops and railway workshops. In view of the fact that it can be adapted to various kinds of work, and dimensions of workpieces it is suitable for assembly work during repairs as well as in production such as straightening of shafts, pressing of bushes, pins or bearings in the corresponding holes, bending, riveting, etc.

HYDRAULIC DOUBLE PRESSURE POWER UNITS

RP 1
RP 6



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DESCRIPTION:

The press is of vertical, top-pressure design and has a three-piston high pressure pump of its own driven by an electric motor. The built-in low pressure accumulator affords a quick closing of the moulds. The operation of this press is highly economical with a minimum consumption of electric power. The press is controlled simply, yet sensitively by a single hand lever. It is fitted with a mechanical bottom ejector of mouldings operated by a hand wheel.

Standard Equipment:

Three-piston pump with V-belt pulley and V-belts, electric motor with contactor, pressure gauge, set of spanners, set of spare packings, operating instructions.

Optional Equipment:

Switchboard with instruments for automatic temperature control of moulds, heated injection head with compressor.

Specification:

Variable moulding force, maximum	tons	45		
Return force of piston, maximum	tons	6.5		
Maximum distance of platens	mm	650	25 1/4"	
Minimum distance of platens	mm	400	15 1/4"	
Stroke of moulding piston	mm	750	9 [illegible]	
Dimensions of platens	mm	400×560	15 3/4"×14 1/4"	
Stroke of [illegible] ejectors	mm	150	5 1/2"	
Gearing force, approx.	kg	150	330	lbs
Approach speed of piston, per second	mm	40	1 [illegible]	
Moulding speed of piston, per second	mm	3.5	[illegible]	
Return speed of piston, per second	mm	27	[illegible]	
Maximum operating pressure	atm	320	4550	psi
Output of electric motor	kW	1.1		
Dimensions of press	mm	920×700×2220	3 1/4"×2 3/4"×7 1/4"	
Weight of press	kg	960	2120	lbs
Shipping weight of press, seaworthy packing	kg	1035	2280	lbs
Volume of seaworthy packing	cu. metres	1.8	64	cu. ft.

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The press is of vertical design with top closing and bottom injection. The operation of the press is controlled by means of a two-lever distributor. The pump is fitted on the frame of the press which forms the tank of the low pressure liquid. The press is fitted with instruments for automatic temperature control of the mould and of the heated injection head.

Standard Equipment:

Pump with V-belt pulley and V-belts, electric motor with protective contactor, 2 pressure gauges, 1 set of spanners, 1 set of spare packings, operating instructions.

Optional Equipment:

Plunger and filling chamber 60 mm (2 5/16") dia., plunger and filling chamber 50 mm (1 15/16") dia., heated injection head including heater elements, oil cleaner, distribution box.

Specification:

Maximum closing force	45	tons	
Maximum opening force	6	tons	
Maximum stroke of closing piston	250	mm	[illegible]
Maximum distance of platens	750	mm	[illegible]
Dimensions of platens	360×400	mm	[illegible]
Clear width	385	mm	[illegible]
Maximum injection force	12	tons	
Maximum stroke of injection piston	175	mm	[illegible]
Speed of closing piston under pressure, per second	3.5	mm	[illegible]
Upward speed of closing piston, per second	27	mm	[illegible]
Maximum speed of injection piston during injection per second	13	mm	[illegible]
Return speed of injection piston, per second	43	mm	[illegible]
Operating pressure	313	atm.	[illegible]
Output of electric motor	1.1	kW	
Output of pump per minute	2.2	litres	[illegible]
Dimensions of press (length×width×height)	1060×750×2100	mm	[illegible]
Weight of press	1120	kg	[illegible]

With use of 60 mm (2 5/16") dia. plunger and filling chamber:

Capacity of filling chamber	240	cu. cm	[illegible]
Specific pressure in material	425	atm	[illegible]
Maximum area of moulding in parting line of mould	85	sq. cm	
Maximum weight of moulding:			
of bakelite powder	125	grammes	[illegible]
of bakelite tablets	240	grammes	[illegible]
of rubber (specific gravity 1 to 2)	240 to 480	grammes	[illegible]

With use of 50 mm (1 15/16") dia. plunger and filling chamber:

Capacity of filling chamber	165	cu. cm	[illegible]
Specific pressure in material	612	atm	[illegible]
Maximum area of moulding in parting line of mould	60	sq. cm	[illegible]
Maximum weight of moulding:			
of bakelite powder	90	grammes	3 oz
of bakelite tablets	165	grammes	[illegible]
of rubber (specific gravity 1 to 2)	165 to 330	grammes	5 3/4 to 11 [illegible]

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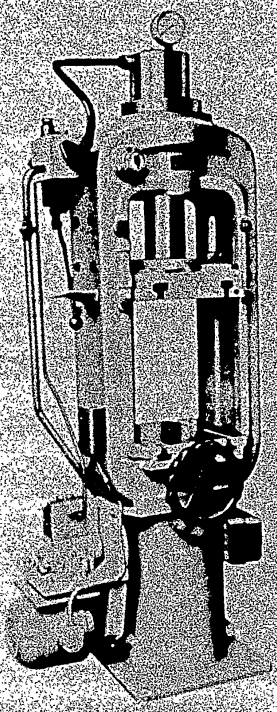
Type CBJ - 45 (LRb - 45) HYDRAULIC PRESS

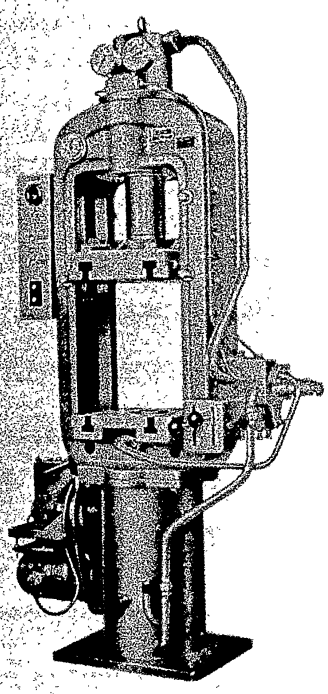


The press is intended for the production of mouldings of thermosets such as Bakelite, carbamide, melamine, horn and celluloid, India rubber, ebonit and synthetic rubber and similar substances in heated moulds. It is suitable for precision work as well as for laboratory applications and may be used to advantage also for other work than the processing of plastics.

STROJEXPORT

TYPE CBS 45-1 (LB 45-1)

HYDRAULIC INJECTION MOULDING PRESS FOR THERMOSETS



This press is intended for the production of small and medium size mouldings of thermosets, such as bakelite and carbamide substances, of rubber, etc. by injection from the pressure chamber into heated moulds as well as by moulding in moulds with hydraulic ejection. The injection piston can be cut out of operation and the press then be used for ordinary moulding.

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HYDRAULIC PLASTIC INJECTION MOULDING PRESS Model LTr 1245

This machine is intended for the manufacture of small and medium-size pressings of thermoplastic materials by applying the injection moulding process. It is capable of working up polythenes, polyamides, acetates and other thermoplastics.

Description of the machine: The press is of the toggle design derived from the well proved principle of the pressure die-casting machines. The die closing is horizontal and the injection vertical into the parting line of the die, the material is plasticized easily in the heating chamber where the temperature is maintained at the required degree by a thermostat. The material is charged automatically from the hopper into the heating chamber at each stroke. By changing pellets being early plasticable. The die closing is highly economical by low-pressure liquid. The high pressure is used only for forming the die closed with great force and for the powerful movement of the injection plunger. The throat of the heating chamber and the die are water-cooled.

The frame is made of cast steel, is sturdy and rigid, and rests on a cast iron base. It contains the closing cylinder, injection cylinder and heating chamber and carries the hopper with the feeding device. The frame is designed to permit the alternation of the stationary die, the ejectors and the automatic attachment for pulling threaded cores from the stationary and movable die halves.

The closing piston moves horizontally within the cylinder bolted on the left-hand part of the frame, it is provided with a head to which the movable die is clamped.

The injection piston moves vertically in the injection cylinder situated in the upper part of the frame. It consists of a hydraulic and incompressible plunger passing into the heating chamber. The automatic feeding device is driven off the injection piston.

The heating chamber is electrically heated. It is arranged to slide in the guide bushes and swings away laterally.

The control is effected by a combined distributor actuated by a single lever. The automatic is designed to prevent the injection of material before the die is closed. It also embodies a valve for the speed reduction of the injection piston.

The thermal regulating equipment consists of a thermostat of a resistor with series incorporated in a control box.

Power. The machine is driven by a two-cylinder hydraulic Power Unit Model RP 11, the 3-cylinder Hydraulic Power Unit Model RP 6, is available for driving of heavy or 2 machines.

Standard equipment: Heating chamber, thermal regulating equipment, standard screw packings, 1 set of service spanners, 1 set of oiling instruction booklet.

Optional equipment: Additional heating chambers, injection plunger with bushings dia 45, 55, 70, 80 mm for different properties of the pressed material. They can also be made according to drawings and samples sent by customers.

The power unit and the connecting pipes between the power unit and the press should be ordered with the machine. Please specify in your order correct characteristics for electric motors and heating.

SPECIFICATIONS

		Metric	English
Diameter of screw injection unit	mm	55	2.2 in
Number of shots per hour (dependent on the size of product)		180—300	180—300
Max. weight of moldings produced per hour	kg	5.5	12.1 lbs
Mean dimensions of dies (vertical x horizontal)	mm	350 x 350	13.7 x 13.7 in
Height of stationary die	mm	350	13.7 in
Maximum opening stroke of movable platen (die)	mm	450	17.7 in
Diameter of plunger for injection	mm	70	2.75 in
Normal diameter of injection plunger	mm	45, 55, 70, 80	1.75, 2.2, 2.75, 3.15 in
Other available pressures in reserve	kg/cm²	470, 610, 900	6000, 8700, 9100
		13000, 20	
Additional attachments or injection plungers for special equipment	mm	45, 55, 70, 80	1.75, 2.2, 2.75, 3.15 in
Electrical power consumption for the heating chamber	kW	12	26.400 lbs
The closing power	tons	45	99.000 lbs
Specific pressure	kg/cm²	1.5	21.33 lbs/in²
Stroke of closing piston	mm	230	9.1 in
Stroke of injection piston	mm	230	9.1 in
Maximum daylight opening of closing platen	mm	1000	39.37 in
Maximum working pressure	kg/cm²	100	1422 lbs/in²
Weight of machine	kg	2700	5940 lbs
Dimensions of machine (length x width x height)	m	2.6 x 1.65 x 2.5	8.5 x 5.5 x 8.5 ft
Weight of machine with operating pressure	kg	3.7	8150 lbs
Delivery period			

We reserve the right to make such changes in design and construction as may be found desirable in order to improve the machine.

All specifications in this leaflet are approximate only and are not to be regarded as binding in detail and are subject to alteration.

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The closing of the mould is horizontal, the injection of the molten material is vertical into the parting line of the mould. This method of operation affords a simple design of the mould and results in a high output of thin walled mouldings. The material is melted in an electrically heated chamber the temperature of which is adjustable and automatically maintained at any given figure. The dosing of the material to be moulded is variable and automatic. The mould is closed economically by low pressure and the high pressure is used merely for pressing the two halves of the mould firmly against each other and for operating the injection piston. The neck of the melting chamber, the injection plunger and the mould are water cooled. The presses are driven by a type RP6 two-pressure pumping set which is capable of driving either two type CSB 70.14 presses or one type CSB 80.30 press. The equipment of the press comprises a switch board with instruments for automatic temperature control and with instruments for the checking of the various periods of the working cycle.

Standard Equipment:

Melting chamber, standard injection plunger with bush, switchboard with instruments for automatic temperature control, 3 sets of spare packings, 1 set of spanners, operating instructions.

Optional Equipment:

The following equipment is supplied to special order and against extra charge:
Type RP 6 pumping set, piping between press and pumping set, 2 high pressure and 2 low pressure stop valves (for connection of two presses to one set), 1 45 mm dia injection plunger with bush for type 70.14 press, 70 mm or 65 mm dia injection plungers for type CSB 80.30 press.

A mixture of water with 3 to 5 % of „Shell Anticorrosion 54" emulsifying oil is to be used as operating liquid.

THE PUMPING SET AND THE PIPING BETWEEN THE PUMPING SET AND THE PRESS MUST ALWAYS BE ORDERED FOR THE PRESS.

Specification:

Material moulded per shot, maximum	grammes	6	
Number of shots per hour (depending on kind of moulding)		12—24	12—24
Maximum weight of molten material per shot	kg	1	2
Maximum dimensions of moulds (horizontal x vertical)	mm	450 x 350	17.7 x 13.7 in
Maximum area of moulding in parting line of mould for pressure of pressure in material at 280 atm (4087 psi)	sq cm	450	70
Standard diameter of injection plunger	mm	45	1.75 in
Pressure in moulded material at standard injection pressure	atm	1000	14220 psi
Diameter of other injection plungers	mm	55	2.2 in
Pressure in moulded material when other plungers are used at same injection pressure	atm	650	9240 psi
Heating power of melting chamber	kW	12	26.4 lbs
Cooling water	litres	60	15.8 gals
Maximum injection stroke	mm	250	10 in
Stroke of closing piston	mm	560	22 in
Stroke of injection piston	mm	260	10.25 in
Maximum daylight opening	mm	1350	53 in
Weight of machine with operating liquid	kg	3500	7700 lbs
Weight of machine with operating liquid	kg	4000	8800 lbs
Dimensions of machine (length x width x height)	m	3.5 x 1.65 x 2.5	11.5 x 5.5 x 8.5 ft
Weight of machine with operating liquid	kg	4.2	9240 lbs
Delivery period		3 months	

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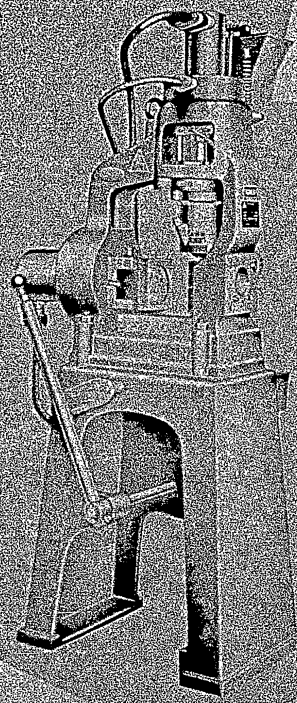
HYDRAULIC PLASTIC

INJECTION MOULDING PRESS

MODEL



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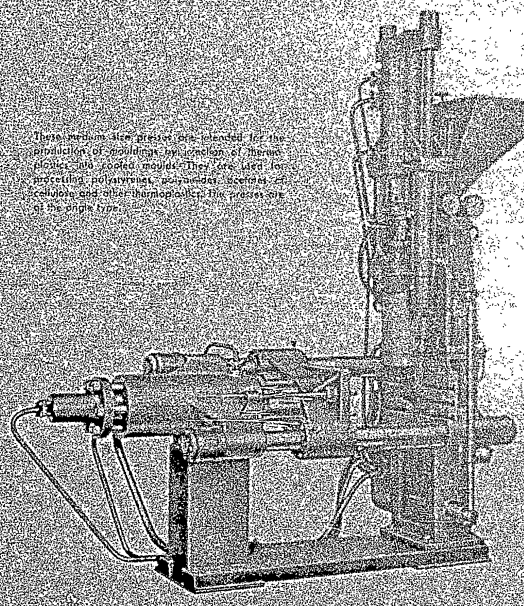
TYPES CSB 70,14 AND CSB 80,30

(TC 2014 and TC 2029)

STROJEXPORT

SEMI-AUTOMATIC HYDRAULIC PRESSES FOR PRODUCTS OF THERMOPLASTICS

These medium size presses are intended for the production of mouldings by injection of thermoplastics into cooled moulds. They are used for processing polystyrenes, polyamides, acetates of cellulose and other thermoplastics. The presses are of the angle type.



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Description:

The press is of vertical design and forms a self-contained unit with its own electric motor-driven pump. It is provided with top closing of the mould and central piston injection perpendicular to the parting line of the mould. The closing and injection forces are variable within wide limits. The operation of the press is controlled by a distribution assembly which is operated by two levers and the press can be operated semi-automatically with a clockwork opening the mould automatically when the set working period has elapsed. The temperature of the mould and of the heated injection head is maintained at the required figure by automatic control equipment.

Specification

Maximum closing force	tons	175	
Maximum opening force	tons	85	
Maximum stroke of closing piston	mm	500	19 11/16"
Max. mum distance of platens	mm	1000	39⅜"
Dimensions of moulds	mm	700 × 700	27 9/16" × 27 9/16"
Max. mum weight of boss	tons	50	
Max. mum working force of injection piston	tons	20	
Maximum stroke of injection piston	mm	250	9⅞"
Speeds of piston:			
closing by low pressure per second	mm	60	2⅜"
closing by high pressure per second	mm	12	½"
opening by low pressure per second	mm	80	3⅛"
opening by high pressure per second	mm	6	¼"
injection by low pressure per second	mm	115	4½"
injection by high pressure per second	mm	12	½"
withdrawal of injection piston by low pressure, per second	mm	180	7"
withdrawal of injection piston by high pressure, per second	mm	28	1⅛"
Capacity of storage and filling chamber	cpal	80	10 cu. ft.
Power of electric motor	kW	4.5	
Weight of press	kg	3500	7720 lbs.
Weight of press outworthy packing	kg	3960	8600 lbs.
Dimensions of press outworthy packing	cu. metres	8.5	300 cu. ft.
Maximum weight of heated mould of from cast iron	grammes	300	11 ozs.
cast steel	grammes	900	2 lbs.
rubber pre-heated by radio frequency	grammes	1800	4 lbs.

Standard equipment:

Type KP2 6 pump with electric motor, electrical equipment required for control of press, electromagnet, 2 thermostats, set of spanners, set of standard packings, operating instructions.

Optional equipment:

Heated injection head.

Please state in your order the voltage available for the electric motors.

The particulars in the prospectus are not binding in detail.

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Each injection assembly has its own electrically heated melting chamber and is adjustable together with this chamber, vertically and horizontally, independently of the other assembly. The mould is closed by pressure liquid supplied by the machine's own pump. The injection of the material being effected by pressure from an accumulator which is charged by this pump. The entire operation of the press is controlled by push-buttons. It is semi-automatic with provision for emergency hand control. The temperature of the melting chambers is adjustable and it is maintained at the set figures automatically. The feeding equipment measures automatically the dose of material for every shot. The pump and all the instruments are mounted directly in the press.

STANDARD EQUIPMENT

Pump with electric motor and starter, 2 pressure shut-off equipments, pressure distributor with electric motor, 2 pressure reducers, auxiliary pump with electric motor for re-pumping of liquid escaped due to lack of tightness, 2 melting chambers, 280 mm (11 1/16") plungers with bushes, equipment for control of automatic and semi-automatic cycle, equipment for automatic temperature control of melting chamber zones, contact pressure gauge, spare packings, auxiliary assembling equipment, operating instructions.

OPTIONAL EQUIPMENT (on special order)

Pneumatic-hydraulic accumulator, connecting piping between machine and accumulator filling with operating liquid, further packings and seals.

SPECIFICATION

Maximum weight of material moulded per shot:			
of acetate of cellulose in two chambers, 800 grammes = 1.1 lbs each)	grammes	1600	2.2 lbs
Number of shots per hour		90	
Melting capacity of 1 chamber, per hour	kg	45	99 lbs
Minimum/maximum width of mould in direction of injection assemblies	mm	400/790	15 ¾"/31"
Standard diameter of plunger	mm	80	3 ⅛"
Pressure in moulded material with standard plunger	atm.	1000	14220 psi.
Maximum input of melting chamber (3 zones)	kW	6 + 3 + 3	
Force for closing of mould	tons	500	
Force for opening of mould	tons	42	
Injection force, 2 × 50 tons, with adjustment down to	tons	2 × 25	
Return force of injection piston	tons	12	
Stroke of closing piston, maximum	mm	500	19 ¾"
Stroke of injection piston, maximum	mm	350	13 ¾"
Maximum distance of platens	mm	1000	39 ⅜"
Dimensions of clamping surface	mm	1000 × 1000	39 ⅜" × 39 ⅜"
Vertical and horizontal adjustment of injection assemblies	mm	150	5 ⅞"
Operating pressure of liquid	atm.	400/200	5650/2850 psi.
Output of electric motor	kW	23	
Dimensions of machine: width × length × height	mm	1000 × 3500 × 2000	39 3/8" × 137 13/16" × 78 ¾"
Weight, below (about 10 cwt)	kg	5000	11000 lbs.

PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR ELECTRIC MOTORS.

The particulars in the prospectus are not binding in detail.

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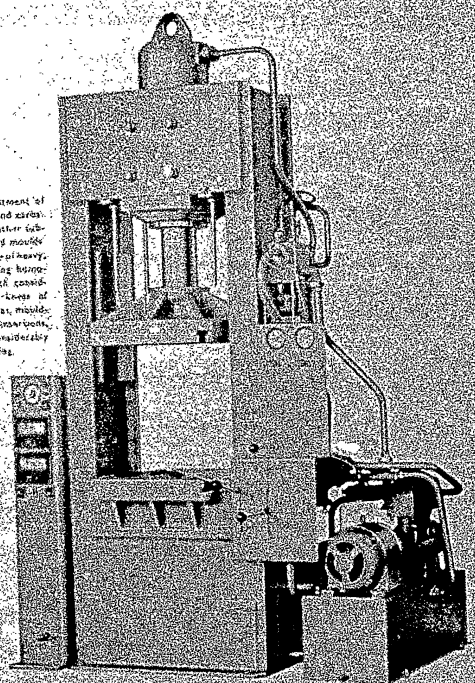
STROJEXPORT

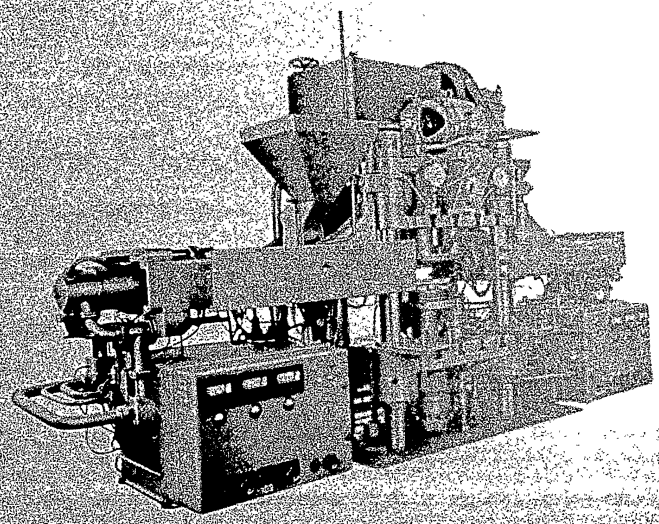
HYDRAULIC INJECTION MOULDING PRESS TYPE CBS 175-1



A hydraulic press for the treatment of thermosets such as plastics and carbonides and also of rubber and other substances by injection into heated moulds. It is intended for the production of heavy, thick walled mouldings requiring homogeneous material, mouldings with considerable differences in the thickness of walls or with complicated cores, mouldings with numerous metal insertions, etc. The production time is considerably increased by injection moulding.

STROJEXPORT

TYPE CSB 500.50 SEMI-AUTOMATIC HYDRAULIC PRESS FOR PRODUCTS OF THERMOPLASTICS



This press has vertical closing of the mould and horizontal injection into the parting line of the mould by means of two injection assemblies fitted opposite each other. It is used for processing polystyrenes, polyamides, acetates of cellulose, etc.

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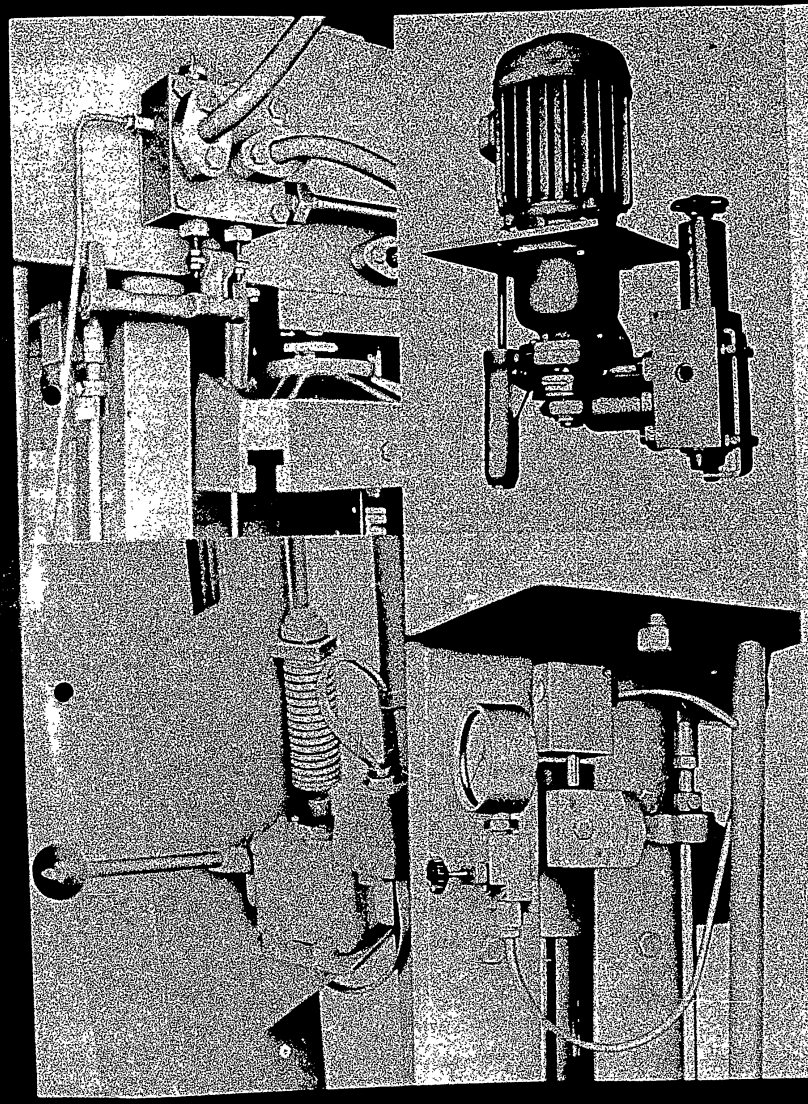

The drive of the press

The press is driven by a type RPZ-3 low pressure pump with a low-pressure gear part and a high-pressure piston part. The pump is driven directly by a flange mounted electric motor. The maximum operating pressure of the low pressure part is set to a constant figure. When the piston pump is operating against a pressure the gear pump is relieved. The pressure of the high-pressure part is infinitely variable in a range of 25 to 100 % of its maximum.

When the hand lever is moved downward and the push-button is depressed the moulding piston moves down quickly at low pressure. As soon as the mould is closed the piston part of the pump is automatically started and pressure oil is supplied to the cylinder. When the set pressure is reached the pump automatically stops pumping oil so that the motor runs relieved of its load. Thereby a saving of 50 to 70 % of power is achieved.

In this phase of the cycle the electric motor of the pump can be stopped entirely.

The electrical equipment

of the press is enclosed in an independent switchgear cabinet entirely separate from the press. This arrangement protects delicate instruments from shocks and allows the electric switchgear cabinet to be set up at the most convenient point.

The automatic mould temperature control

is also accommodated in the electric switchgear cabinet and consists of two locking [illegible] regulators and an iron-constantan line which is attached to the mould by means of [illegible] specially arranged for the purpose.

Standard Equipment

Type RPZ-3 pump with 220/380 Volt electric motor
pressure gauge
time relay with electromagnetic catch and hydraulic safety element
instruments for automatic mould temperature control
set of spanners
set of spare packings
operating instruction book

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The type CBJ 100 hydraulic press is a medium size press intended for moulding articles of thermosets such as bakelite, carbamide, aralith, celluloid, rubber, etc., in heated moulds.

Apart from the treatment of these artificial compounds it can also be used for working sheet metal, wood, ceramic materials, etc. It may be equipped with heaters or, if required, cooled plates.

The frame of the press

is hydraulically welded. All the hydraulic equipment is arranged in the frame of the machine under easily removable sheet metal covers. In the upper part of the press the oil tank is accommodated together with the oil pump driven by a flange-mounted electric motor. The prismatic guideways for the upper platen are adjustable.

The hydraulic cylinder

is made of cast steel and built into the upper stirrup of the frame.

The moulding piston

is finely ground and carries the upper platen provided with T-slots for the clamping of the upper part of the mould.

The lower platen

is built into the lower stirrup of the press and is likewise provided with T-slots for the clamping of the lower part of the mould.

The control

is effected by a hand lever, or automatic, operated by lift pull rods of the upper platen.

The control gear

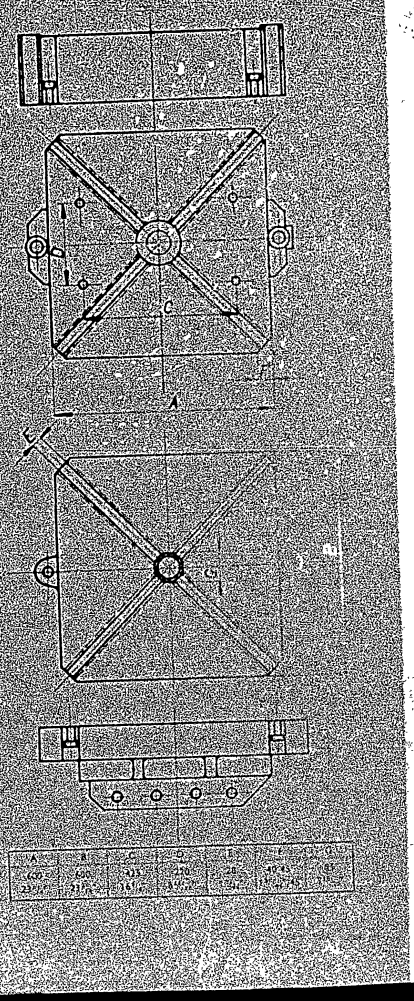
The control is used, i.e. by a lever and a push-button controlling the hydraulic valves.

The valves are operated by the intermediary of a sensing pull rod, the distributor valves which are easy to replace are made of hardened steel and finely ground.

The moulding piston moves downward and the push-button is depressed the moulding piston starts its working stroke. When the moulding operation is completed and the hand lever moved to the left, the oil flow to the cylinder is stopped automatically and the press opens.

The piston is returned to its initial position automatically by means of a built-in time relay which releases the starting lever by means of an electromagnetic catch fitted with a hydraulic safety element.

The time necessary for the setting of the moulding is set on the time relay which automatically opens the moulding as soon as the pressure has dropped. When the moulding piston reaches its extreme upper position it is stopped by a limit switch.



A	B	C	D	E	F	G
650	600	450	220	140	1140	1150
25½"	23⅝"	17¾"	8⅝"	5½"	44⅞"	45¼"

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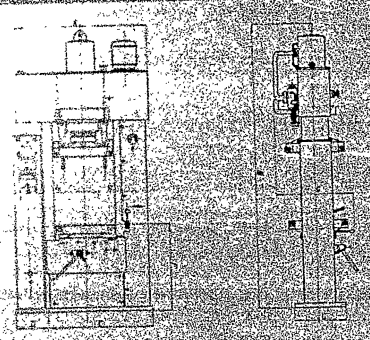
SPECIFICATION

Maximum moulding force	tons	100	
Maximum opening force	tons	50	
Force of mechanical ejector	tons	20	
Dimensions of platens	mm	600×600	23 1/8"×25 1/2"
Maximum distance of platens	mm	650/700	25 1/2"/27 1/2"
Minimum distance of platens	mm	270/320	10 11/16"/12 5/8"
Clear width between column	mm	620	24 3/8"
Diameter of piston	mm	200/140	7 7/8"/5 1/2"
Maximum stroke of piston	mm	360	14 1/2"
Speed of piston			
downward, low pressure, per second	mm	52	2"
downward, high pressure, per second	mm	1.2	3/64"
upward, low pressure, per second	mm	44	1 23/32"
upward, high pressure, per second	mm	2.6	3/32"
Stroke of mechanical ejection	mm	165	6 1/2"
Stroke with hand ejection	mm	250	9 11/16"
Maximum operating pressure	atm	320	4550 psi
Capacity of oil tank*	litres	80	17.6 Imp Galls
Overall dimensions of press	mm	780×1430×2529	27"×4'9"×8'4"
Weight of press	kg	3500	7720 lbs

[illegible]



A	B	C	D	E	F	G
1400	2529	500	310	1120	720	780
55 1/8"	30 1/16"	19 11/16"	12 1/16"	44 1/16"	28 3/16"	30 11/16"

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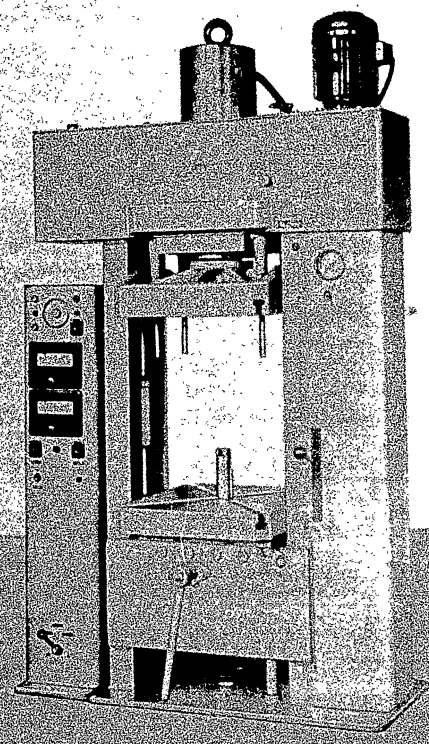

CBJ100

SEMI-AUTOMATIC HYDRAULIC PRESS

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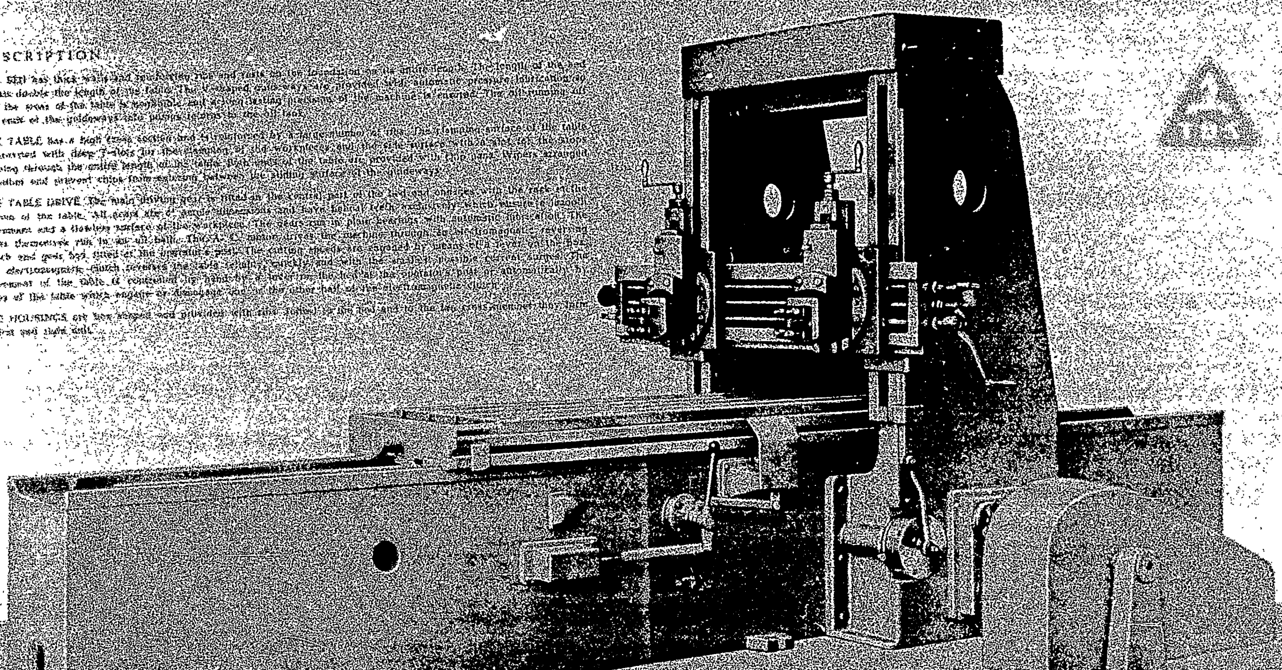
DESCRIPTION

THE BED has thick walls and [illegible] The length of the bed equals double the length of the table. The V-shaped slideways are provided with automatic pressure lubrication [illegible]

THE TABLE has a high cross section and [illegible] The clamping surface of the table is provided with deep T-slots for the clamping of the workpieces [illegible] of the slideways.

THE TABLE DRIVE. The main driving gear [illegible] with the rack on the bottom of the table. [illegible] The gears run in plain bearings with automatic lubrication. [illegible] reversing [illegible] The electromagnetic clutch [illegible] movement of the table [illegible]

THE HOUSINGS are box shaped and [illegible]



[illegible]

[illegible] can be engaged or disengaged independently [illegible]

THE LUBRICATION of the guideways of the bed is automatic. [illegible]

STANDARD EQUIPMENT

2 toolheads
Toolholders
Electrical equipment, including electromagnetic clutch and pulley
Main drive motor including pulley and V-belts
Set of spanners and levelling plates
Operating instruction booklet

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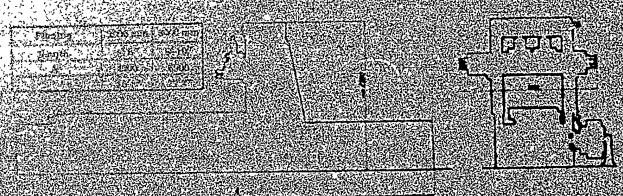
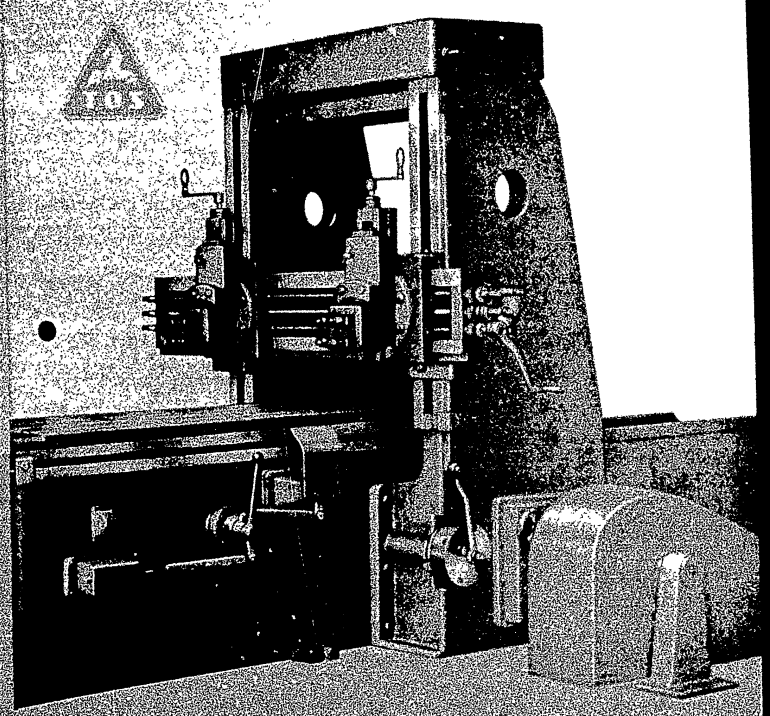
SPECIFICATION

Planing width	mm	850		33"	
Planing length	mm	2000	3000	6'6"	9'10"
Planing height	mm	280		30"	
Clamping surface of table (width × length)	mm	685×2030	685×3030	2'3"×6'7"	2'2"×9'11"
Weight and distance between T-slots	mm	22/170		22/32" 6 11/16"	
Movement of tool slide	mm	220		8 11/32"	
Cutting speed	metres per min.	11 – 16 – 22		36" – 53" – 72" per min.	
Knife speed	metres per min.	20		92" per min.	
Cross feed	mm per stroke	0.3 to 5		0.012" to 0.120" per stroke	
Tool slide feed	mm per stroke	0.3 to 2.7		0.012" to 0.108" per stroke	
Power of motor	HP	10			
[illegible]	r.p.m.	940			
Weight of machine with standard equipment	kg	4800	6000	10000 lbs.	13200 lbs.
Weight of machine with seaworthy packing	kg	6200	7650	13000 lbs.	16900 lbs.
[illegible]	m³	12	14.5	430 cu. ft.	520 cu. ft.





IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

[illegible] being made, this specification is not to be regarded as binding in detail [illegible] without notice.

STROJEXPORT

[illegible] • CZECHOSLOVAKIA

H85A

DOUBLE HOUSING PLANING MACHINE TYPE

Heavy Duty Precision Machine [illegible] of which [illegible] first class quality of the surface finish. The [illegible] of this machine makes it equally well-suited for the single part and quantity production.

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25

SPECIFICATION

Stroke	mm	250	9 27/32"
Diameter of circular table	mm	500	20"
Width and pitch of T-slots	mm	18 × 95	45/64" × 3.4"
Transverse movement of table	mm	450	18"
Longitudinal movement of table	mm	560	22"
Adjustment of ram	mm	250	10"
Distance, seating surface of tool to column	mm	465	18"
Distance, seating surface of tool to ram guide	mm	135	5 5/16"
Distance, clamping surface of table to lower end of ram guide	mm	365	14"
Maximum distance, tool to clamping surface of table	mm	535	21"
Transverse travel of ram			10"
Number of speeds			8
Maximum permissible cutting speed	m/min	35	117 f min
Number of double strokes of ram per minute			22 to 112
Maximum pulling power	kg	1000	2200 lbs
Feeds: Range of continuous longitudinal feeds	mm	0.2 to 1.6	0.080" to 0.640"
Range of continuous cross feeds	mm	0.2 to 1.6	0.080" to 0.640"
Main driving motor: Speed	r.p.m.		940
Output	HP		6.1
Motor for rapid travel: Speed	r.p.m.		1400
Output	HP		11
Floor space (width by length)	mm	1425 × 2270	56" × 89"
Weight	kg	2850	6280 lbs
Contents boxed	m³	7.3	cu. ft. 260
Dimensions of packing case (width/length/height)	mm	1500 × 2250 × 2150	59" × 89" × 85"

THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS HAS TO BE STATED IN THE ORDER.

The machines are continuously being improved upon. The data given in this pamphlet are therefore not binding in detail.

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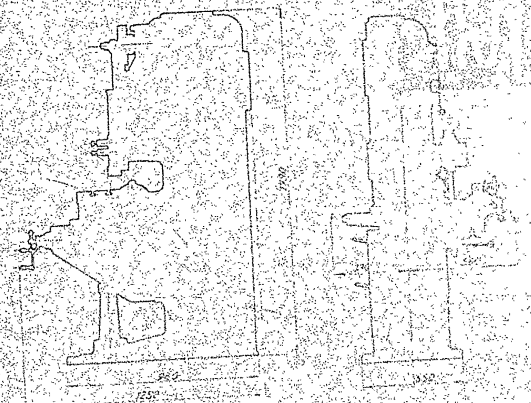
SPECIFICATION

		Metric	English
Maximum height of stroke	mm	165	6.3
Diameter of circular table	mm	320	12.6
Width distance between T-slots	mm	15.80	0.55" × 3.14"
Vertical travel of table	mm	270	10.6"
Cross travel of table	mm	320	12.6"
Longitudinal travel of table	mm	200	7.8"
Distance, tool edge to column	mm	265	10.4"
Distance, tool edge to ram guide	mm	100	3.94"
Distance, clamping surface of table to lower end of ram guide	mm	270	10.6"
Maximum distance, tool to clamping surface of table	mm	390	15"
Ram guide swivels in both directions		5	1 deg
Number of speeds		5	5
Number of up and down strokes per minute		71—112—180	71—112—180
Maximum pulling power	kgs	300	1 lbs 170
Feeds, infinitely variable: longitudinal feeds, ranging from	mm	0.1—0.6	0.004"—0.0236"
cross feeds, ranging from	mm	0.1—0.6	0.004"—0.0236"
Main drive motor: Speed	r.p.m.	1400	1400
Output	HP	2.04	2.04
Floor space required (width/length)	mm	950×1200	37" × 47"
Weight of machine: with standard equipment	kgs	1050	lbs 2370
with railway packing	kgs	1100	lbs 2470
with seaworthy packing	kgs	1200	lbs 2960



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IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!

As improvements in design are continually being made, this specification is not to be regarded as conditional. Details and dimensions are subject to alteration without notice.

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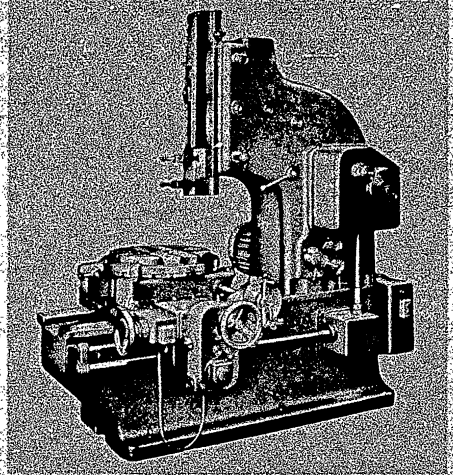
TYPE

HOV 25

SLOTTING MACHINE

The machine is intended for the machining of flat as well as circular surfaces and may be used to advantage for individual manufacture as well as for batch production. It is suitable for smaller workshops and also for medium size plants. Outstanding features: high output, high precision, close work, simple operation.



DESCRIPTION:

The column is of a sturdy design, adequately reinforced with ribs and consists of two parts. The wide opening of the machine makes it suitable for the machining of objects of the most varied shapes.

The machine is driven by a flange-mounted electric motor through a multi-plate clutch and brake fitted in the column from which the movement is transmitted through gears to a slide. The engagement of the required number of up-and-down strokes per minute is set by means of a selector drum controlled by a lever arranged at the right hand side of the column. The machine is started or stopped by means of the multi-plate clutch or brake which enables the ram to be stopped in any position. A fast speed movement or geometric progression with a coefficient of 1.25.

The ram has a high cross section with flat guideways; the ram head can be tilted as much as 10°. The tool holder is provided with a tool lifter. The ram is driven by a slide.

The feed positively arranged on the right of the column. The feed is continuous and may be adjusted within a range of 0.2 to 1.6 mm (0.008 to 0.063") per double stroke. There is a dial on the feed box indicating the rate of feed and also the spring acted by reference to any given number of double strokes per minute and reversible at choice.

The table is provided with T-slots. It is divided on its circumference into 360 divisions in the centre of the table there is a pocket into which a pin which may be used for centering for the machining of circular surfaces. A special dividing attachment for indexing operations is provided for the successive setting of any number of divisions in addition to that there is a direct indexing arrangement on which the table is set to 2, 3, 4, 6, 8, 12 and 24 parts may be cut.

The table has a longitudinal, cross and circular feed, hand driven as well as automatic. It is arranged to be overload by a safety device. The table can be moved rapidly in any direction by means of a separate motor. The rapid travel is effected by an independent electric motor. The longitudinal and cross feeds may be locked by clamps.

The drive runs in an oil bath. The lubricating system is operated by a gear pump. The pump draws the oil from a tank from which it is distributed to the various lubricating points. The correct function of the lubricating system may be watched by a sight glass.

The electrical equipment is enclosed in a sheet iron housing at the left hand side of the machine.

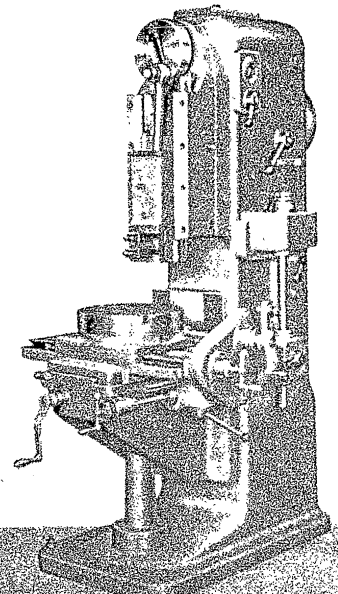
TOS

HOV 16

SLOTTING MACHINE

MODEL HOV 16

This machine is intended for smaller workshops with single part or series production. Its outstanding features are great output, as well as high precision and cleanliness of work. All controls are centralized to be easily accessible from the operator's position.



THE COLUMN is of the box-type and has a sturdy construction which is adequately ribbed. At the bottom of its front side it has the prismatic guides for the knee and at the top the surface for the ram-ways.

THE DRIVE is by V-belts from the motor mounted on a hinged plate inside the tower part of the column, through a multi-plate clutch to the reduction gearing in the upper part of the column, whence the power is transmitted by an eccentric to the ram. For correct belt tension adjustment the hinged plate is swung down. The desired number of up and down strokes is set by shifting the reduction gear with the aid of a lever arranged on the right hand side of the column. The machine is started by a multiple disc clutch and stopped by a multi-plate brake enabling the instant stopping of the ram in any position. The clutch and the brake are adjustable and also removable through the cover on the left hand side of the column, they are easily accessible. The ram is provided with a tool lifter. The ram is driven by a slide.

THE RAM made of cast steel is flat and of rigid construction. The play in the guides of the ram which may be swung up to 8° to the right and left is eliminated by a taper gib. The tool lifter operates automatically.

THE FEED ATTACHMENT is located on the right hand side of the column. The feed is infinitely variable within a range of from 0.2 to 1.6 mm per double stroke, both with the machine running and at rest. The feed rate is read on a dial provided on the feed box.

The table is of the circular type and has three radial T-slots in its centre it has a centering spot hole for circular cutting. Its circumference is divided into 360 divisions. For accurate gearing of any number of divisions (as per the table) a special dividing attachment for index indexing is provided.

THE TABLE FEED is longitudinal, cross or circular and proceeds either by hand or automatically. A safety clutch protects the table from overload.

THE LUBRICATION of the driving mechanism and of the rapid is automatic by the central system. An oil pump supplies the oil through a filter to the tank whence it is distributed to the individual oiling points. Correct function of the pump may be watched in the sight windows.

STANDARD EQUIPMENT: 2 tool boxes, tool box with tool lifter, set of spanners, V-belts and motor pulley, electrical equipment including motor with hinged plate, indexing attachment, operating instruction booklet.

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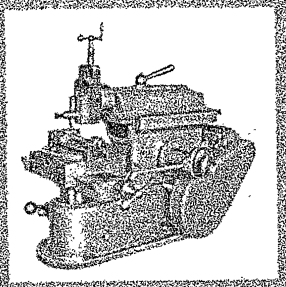
HO 20

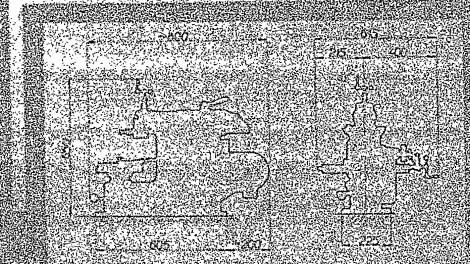


SPECIFICATIONS

Length of stroke	[illegible]	[illegible]
Working surface of table	[illegible]	[illegible]
Vertical adjustment of table	[illegible]	[illegible]
Cross adjustment of table	[illegible]	[illegible]
Vertical adjustment of [illegible]	[illegible]	[illegible]
Maximum distance table to [illegible]	[illegible]	[illegible]
Number of [illegible] speeds	[illegible]	[illegible]
Number of strokes per min.	[illegible]	[illegible]
Automatic [illegible] of table per stroke	[illegible]	[illegible]
Motor speed	[illegible]	[illegible]
Output	[illegible]	[illegible]
Floor space required	[illegible]	[illegible]
Weight of machine with standard equipment	[illegible]	[illegible]
with [illegible]	[illegible]	[illegible]
with seaworthy packing	[illegible]	[illegible]
Contents boxed	[illegible]	[illegible]

As improvements in design are continually being made, this specification is not to be regarded as binding in detail and dimensions are subject to alteration without notice.

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY.



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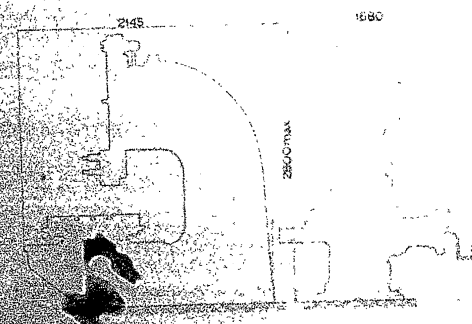
STANDARD EQUIPMENT [illegible]

SPECIFICATIONS

Maximum length of stroke
Diameter of [illegible] table
Cross travel of table
Longitudinal travel of table
Distance, tool edge to column
Distance, tool edge to ram [illegible]
Distance, table to ram [illegible]
Number of speeds
Number of strokes per minute [illegible]
Feeds, 6 longitudinal and [illegible]
Motor speed
Output
Floor space required
Weight of machine with standard [illegible]
with [illegible]
with seaworthy [illegible]
Contents boxed

WHEN ORDERING SPECIFY [illegible]



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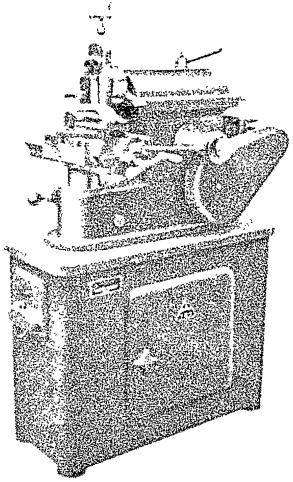
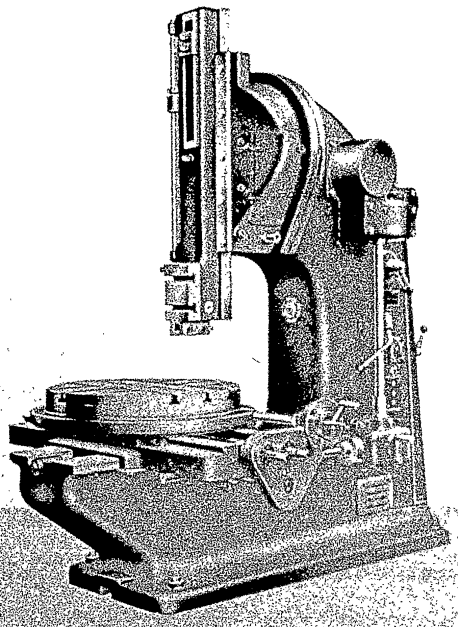
BENCH SHAPER MODEL HD 20





SLOTTING MACHINE MODEL ST 350

ST 350

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HOVING

SPECIFICATIONS

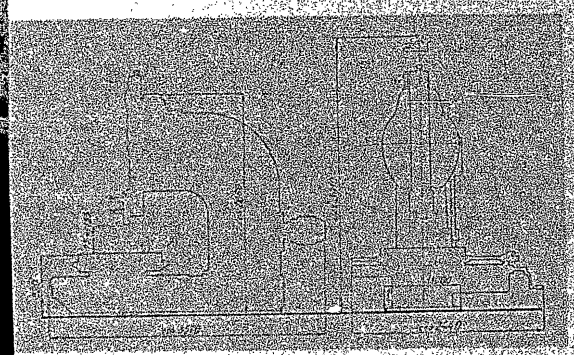
		Metric	English
Maximum length of stroke	mm	600	24"
Maximum cutting length	mm	1100	44"
Width of table	mm	500	20"
Cross travel of table	mm	500	20"
Longitudinal travel of table	mm	1000	40"
Adjustment of ram	mm	170	6.8"
Distance, tool slide to column	mm	1100	44"
Distance, tool slide to ram	mm	350	14"
Diameter, clamping surface of table	mm	750	30"
Maximum distance of tool to clamping surface of table	mm	1100	44"
Cross adjustment of ram			
Number of speeds			
Maximum ram cutting speed			
Number of strokes per minute			
Maximum cutting force			
Feeds: continuous longitudinal and cross feeds	mm	0.35–1.4	0.01"–0.05"
continuous cross feed, rotating drum	mm	0.35–1.4	0.01"–0.05"
Main motor output: Normal			
Optional			
Coolant pump motor: Normal			
Optional			
Hydraulic pump motor: Normal			
Optional			
Floor space required (length × width)			
Weight of machine with standard equipment	kg		
Weight of machine with packing	kg		
Weight of machine with assembly packing			
Current phase			

STANDARD EQUIPMENT: Main drive motor with electrical equipment, rapid traverse motor, indexing attachment, 2 tool boxes, V-belts, motor pulley, set of spanners, operating instruction booklet.

OPTIONAL EQUIPMENT: Cooling attachment.

As improvements in design are constantly being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!



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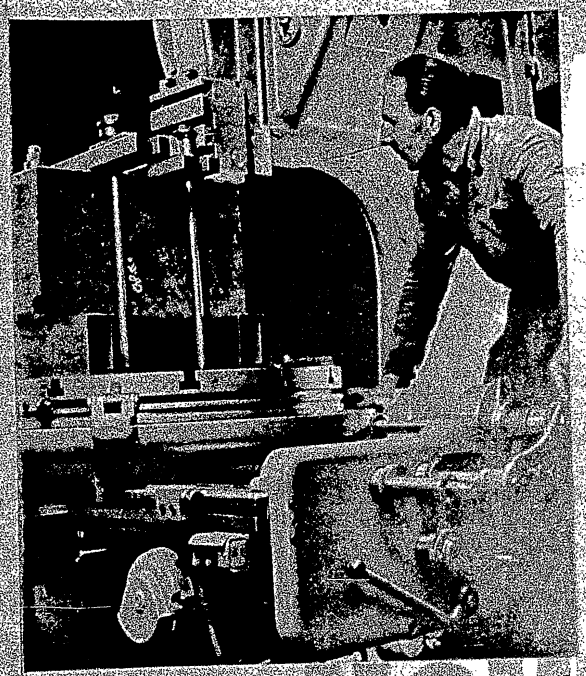

SLOTTING MACHINE
Model HOVING

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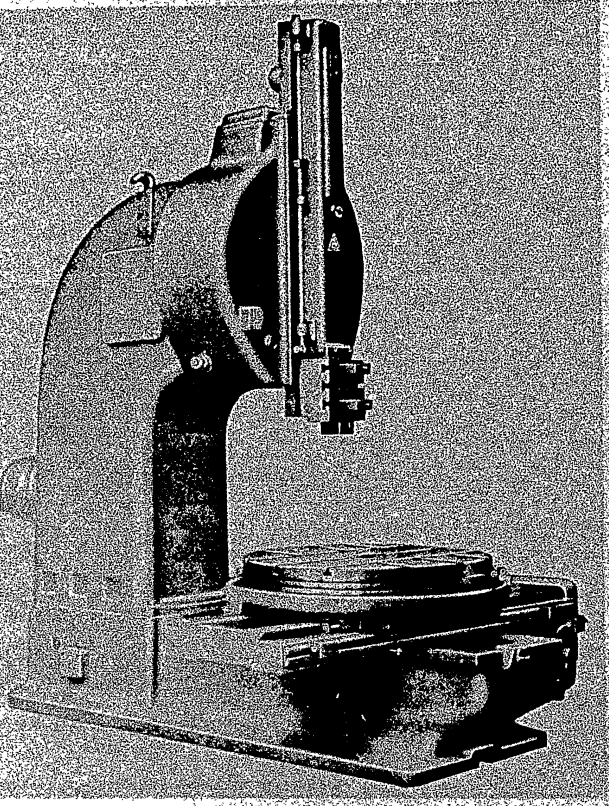


SLOTTING MACHINE Model HOV 63

is intended for slotting operations on medium size and large machine components.
Its outstanding features are: Great Output, High Accuracy, Ease of Operation.
The machine is equally well suited for single part as well as quantity production.

GENERAL DESCRIPTION:

THE COLUMN is of sturdy construction, adequately reinforced and is cast integrally with the bed. A large overhang of the column enables the machining of a wide variety of parts.

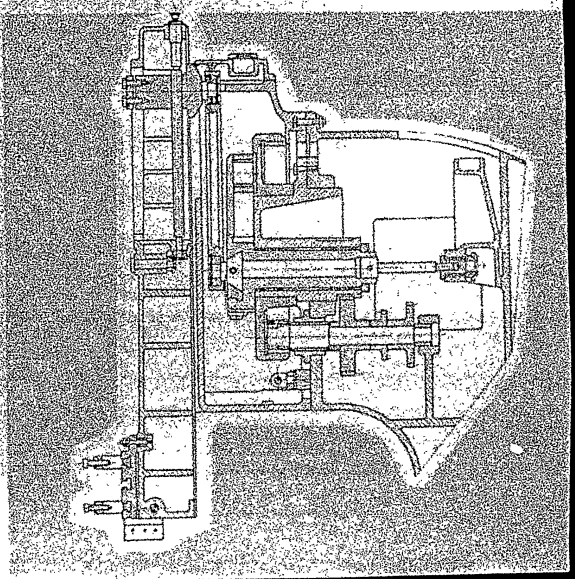
THE DRIVE is by V-belts from the motor through a multi plate clutch in conjunction with a brake, and through a gear box mounted at the top of the column. The number of up and down strokes is changed by levers located at the front of the column. The clutch with the brake enables the stopping of the ram in any position.

THE RAM of exceptionally large section is fitted with flat guideways. The ram head swivels 10° in either direction. Accurate adjustment is made on a scale. The tool holder is lifted automatically. The ram is adjustable by 420 mm (16.5") and driven by a link mechanism.

THE TABLE of the circular type is fitted with T-slots. On its circumference it has a direct reading dial with 360 divisions. In the centre of the table is a taper hole for the central mandrel which is used for circular cutting. A built-in indexing attachment enables to obtain any number of divisions. The table feed in the longitudinal, cross and circular direction is by hand and automatic. The feed speed is infinitely variable in the range of 0.25–25 mm (0.01–0.1") per 1 stroke and the feed rate may be set both when the machine is at rest and while running. The machine is also arranged for rapid adjustment of the table in all directions. A safety clutch protects the table against overload. Adjustable stops for automatic feed release are provided.

THE LUBRICATION of the driving mechanism and of the ram is automatic by the central system. The oil pump supplies oil through an oil filter to the tank whence it flows through a pipping to the individual oil points. Correct function of the lubrication may be watched in the sight windows.

Diagram of link mechanism.



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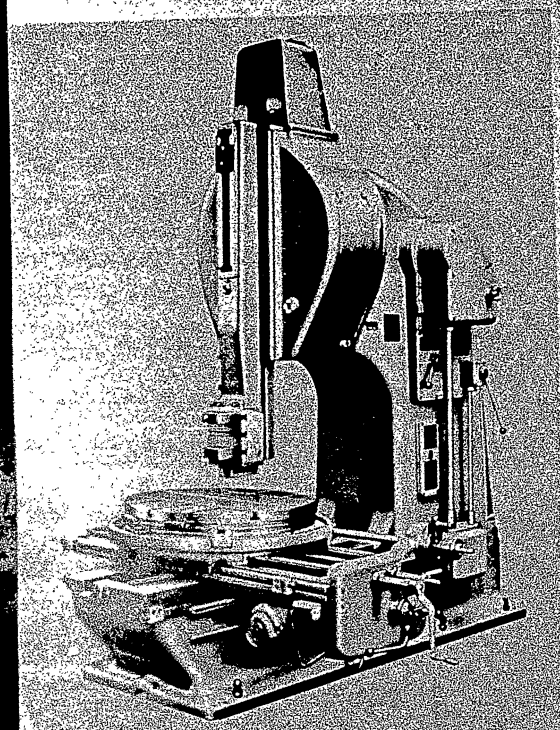


SLOTTING MACHINE MODEL HOV 45

is intended for slotting operations on medium size and large machine components. Its outstanding features are:

Great Output, High Accuracy, Ease of Operation.

The machine is equally well-suited for single part as well as quantity production.

GENERAL DESCRIPTION

THE COLUMN is of sturdy construction, adequately reinforced and is cast integrally with the bed. A large overhang of the column enables the machining of a wide variety of parts.

THE DRIVE is by V-belts from the motor through a multi-plate clutch in conjunction with a brake and through a gear box mounted at the top of the column. The number of up and down strokes is changed by levers located at the front of the column. The clutch with the brake enables the stopping of the ram in any position.

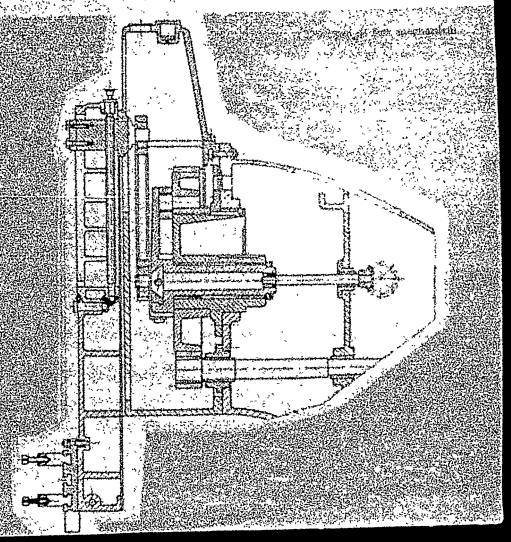
THE RAM of exceptionally large section is fitted with flat guideways. The ram head swivels 10° in either direction. Accurate adjustment is made on a scale. The tool holder is lifted automatically. The ram is adjusted by 500 mm (20") and driven by a link mechanism.

THE TABLE of the circular type is fitted with T-slots. On its circumference it has a direct reading dial with 360 divisions. In the centre of the table is a taper hole for the central mandrel which is used for circular cutting. A built-in indexing attachment enables to obtain any number of divisions. The table feed in the longitudinal, cross and circular direction is by hand and automatic. The feed speed is infinitely variable to the extent from 0.2 – 2 mm (0.008" – 0.08") per 1 stroke and the feed rate may be set both when the machine is at rest and while running. The machine is also arranged for rapid adjustment of the table in all directions. A safety clutch protects the table against overload. Adjustable stops for automatic feed release are provided.

THE LUBRICATION of the driving mechanism and of the ram is automatic by the central system. The oil pump supplies oil through an oil filter to the tank whence it flows through a piping to the individual oil points. Correct function of the lubrication may be watched in the sight windows.

STANDARD EQUIPMENT: Main drive motor with electrical equipment, rapid traverse motor, indexing attachment, 2 tool boxes, V-belts, motor pulley, set of spanners, operating instruction booklet.

OPTIONAL EQUIPMENT: Cooling attachment.



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HOVAL

SPECIFICATIONS

		Metric	Standard
Maximum height of stroke	mm	[illegible]	[illegible]
Diameter of circular table	mm	[illegible]	[illegible]
Width of stroke between T-slots	mm	[illegible]	[illegible]
Cross travel of table	mm	[illegible]	[illegible]
Longitudinal travel of table	mm	[illegible]	[illegible]
Adjustment of ram	mm	[illegible]	[illegible]
Distance, tool edge to column	mm	[illegible]	[illegible]
Distance, tool edge to ram guide	mm	[illegible]	[illegible]
Distance, clamping surface of table to lower end of ram guide	mm	[illegible]	[illegible]
Maximum distance of tool to clamping surface of table	mm	[illegible]	[illegible]
Cross adjustment		[illegible]	[illegible]
Number of speeds		[illegible]	[illegible]
Maximum safe cutting speed	m/min	[illegible]	[illegible]
Number of strokes per minute		[illegible]	[illegible]
Maximum pulling power		[illegible]	[illegible]
Feedal continuous longitudinal feed ranging from	mm	[illegible]	[illegible]
continuous cross feed ranging from	mm	[illegible]	[illegible]
Main drive motor Speed	r.p.m.	[illegible]	[illegible]
Output	HP	[illegible]	[illegible]
Rapid traverse motor Speed	r.p.m.	[illegible]	[illegible]
Output	HP	[illegible]	[illegible]
Coolant pump motor Speed	r.p.m.	[illegible]	[illegible]
Output	HP	[illegible]	[illegible]
Quantity supplied	l/min	[illegible]	[illegible]
Floor space required (width × length)	mm	[illegible]	[illegible]
Weight of machine with standard equipment	kg	[illegible]	[illegible]
Weight of machine with packing	kg	[illegible]	[illegible]
Weight of machine with seaworthy packing	kg	[illegible]	[illegible]
Contents boxed	m³	[illegible]	[illegible]

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

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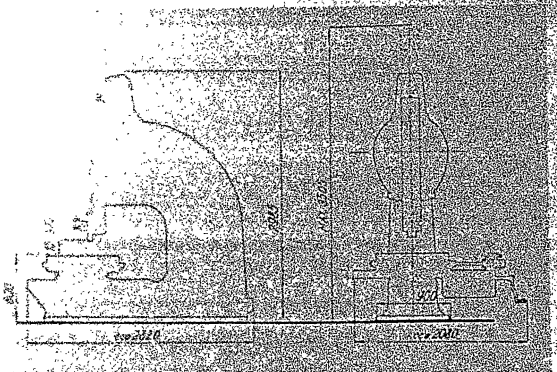

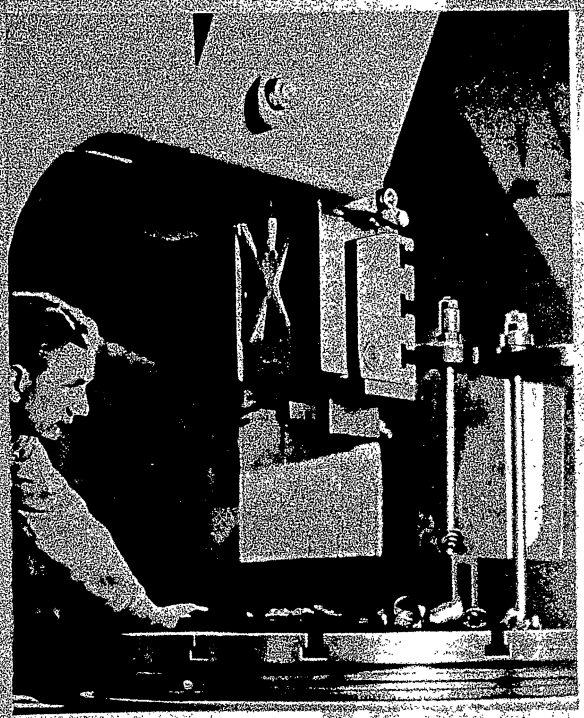

SLOTTING MACHINE
Model

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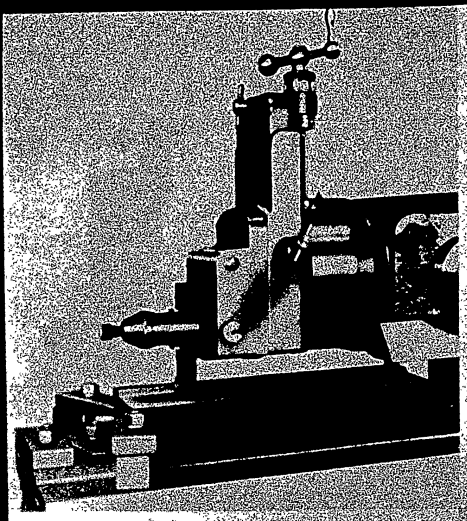


DESCRIPTION:

The machine consists of 3 main groups:

1 COLUMN WITH CAST IRON BASE.

The main drive motor of 5.5 kW and 1400 r.p.m. rests on the base. The power from the motor is transmitted by V-belts to the gearbox producing 8 speeds which are changed by a lever located on the left hand side of the column. The column carries a box containing the feed shaft mechanism for the table feed in either direction. The feed rate can be adjusted horizontally by 32 feeds 0 to 4 mm, in the vertical direction the feed adjustment is ten times finer. An operating plate is fastened on the feed box giving the ram stroke and the cutting speeds. The rate of the ram stroke is adjusted by means of a hand crank mounted on a pin projecting from the feed box. The link gear with the fork engagement for the ram drive is also arranged on the column. On the top of the column there are the ram ways and on its front the crossrail guides.

2 TABLE.

The table is mounted on a slide and is moved either by power or by hand both in the vertical and horizontal direction. On the top and on both sides the table is provided with T-slots. The central T-slot is precision made and serves for clamping the vices or various fixtures. At the front the table rests on the table support which, when locked, increases the rigidity of the machine. Before starting the operation the crossrail which slides on the vertical column-ways should be clamped to the guideways by means of screws to increase the rigidity of the machine.

To prevent any damage to the machine and defects arising from striking the stop dog in the extreme positions of the table when using the automatic feed, a friction clutch is incorporated in the feed box. The clutch slips if the table strikes an obstacle.

3. RAM AND TOOL HEAD.

The ram with the tool head moves in the top slide-ways of the column. A trapezoidal screw spindle passes through the centre of the ram. The nut of the trapezoidal screw forms a fork which is freely fixed to the ram at one end and to the link at the other end. By loosening the fork the ram can be adjusted to suit the surface to be machined. The ram adjustment is accomplished by turning a square pin projecting from the ram. The tool slide is provided on the front of the ram, moving in the ways of the swivelling tool head which swivels up to 90 deg. in either direction for the machining of angular surfaces. The tool slide carries the tool lifter with the tool holder. The tool lifter swivels 30 deg. in both directions to enable the tool to be fully utilized. A central system of lubrication is provided. A plunger pump supplies the oil from the oil tank located in the base through a filter to all oiling points. The surplus oil flows back into the oil tank.

TYPE P 2.

This machine type differs from the Type P 1 in the following features:

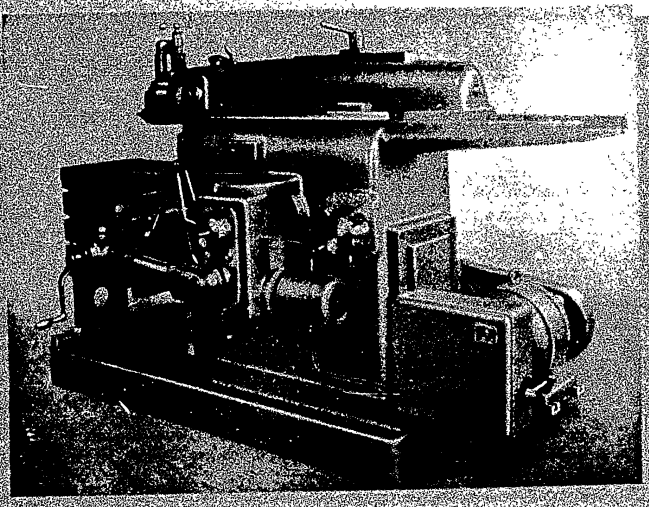
1. The feed mechanism is equipped with an additional electric motor of 0.55 kW and 1400 r.p.m. for the rapid traverse and rapid adjustment of the table both in the horizontal and vertical direction. The rapid traverse always proceeds in the opposite direction to the normal feed.

2. The ram incorporates a device for the automatic vertical travel of tool slide. The rate of the vertical feed is adjusted by 0.1 mm from 0 to 1 mm. This is done by means of a pawl and internal ratchet through gears to the screw spindle of the tool slide. By shifting a lever, which is done by striking the adjustable stop on the column, the vertical feed is automatically obtained.

STANDARD EQUIPMENT: Electrical equipment, 2 hand cranks, grease gun, set of spanners, operator's instruction booklet.

OPTIONAL EQUIPMENT: Type Va swivel vice for clamping smaller parts, width of jaws 250 mm, Type Vb swivel vice, width of jaws 300 mm.

When ordering, kindly state all working conditions which could have an influence on the electrical equipment such as ambient temperature, moisture, tropical conditions, etc.



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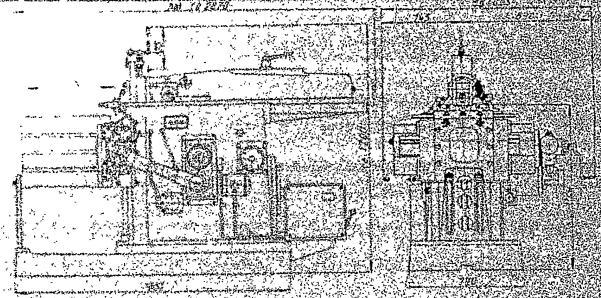
SPECIFICATIONS

Maximum shaping length	mm	630	24.8"
Clamping surface of table (width × length × height)	mm	400×630×475	15.75"×24.8"×18.7"
Maximum pulling power	kg	900	2000 lbs.
Number of T-slots on each clamping surface of table		3	3
Width and distance between T-slots	mm	20×115	0.79"×4.5"
MOVEMENTS:			
Vertical movement of table	mm	360	14.1"
Horizontal movement of table	mm	730	28.7"
Vertical movement of tool slide	mm	175	6.9"
Adjustment of ram	mm	400	15.7"
Maximum-minimum distance, clamping surface of table to lower surface of ram-ways	mm	400/40	15.7"/1.6"
SPEED AND STROKE:			
Number of speeds		8	8
Number of double strokes per minute: minimum		11	11
maximum		125	125
Cutting speed: minimum	m/min.	1	39.4" p. min.
maximum	m/min.	47	15.5" p. min.
Horizontal feed of table (with automatic movement) per 1 double stroke ranging from	mm	0.2—4	6—127 cuts p. in.
Feed of tool slide (with automatic movement) per double stroke (only with Type P 2) ranging from	mm	0.1—1	25—254 cuts p. in.
Vertical feed of table with rapid traverse (only with P 2)	mm/min.	210	8.2" p. min.
Horizontal feed of table with rapid traverse (only with P 2)	mm/min.	2100	82" p. min.
DRIVE			
Main drive motor: Speed	r.p.m.	1420	1420
Output	kW	5.5	5.5
Rapid traverse motor (only with P 2): Speed	r.p.m.	1400	1400
Output	kW	0.55	0.55
DIMENSIONS AND WEIGHT:			
Floor space required	cm	163×282	64"×111"
Height of machine	cm	170	67
Weight of machine with standard equipment	kg	3200	7500 lbs.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!



As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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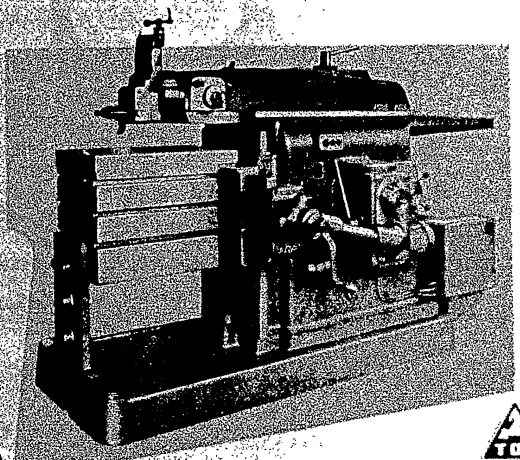
SHAPING MACHINE Model HO 63



This High-speed Shaper is adapted for the machining of a wide variety of parts having a maximum length of 630 mm. The machine has 8 speeds ranging from 11 to 125 double strokes per minute, the maximum cutting speed being 47 m/min. The parts to be machined are clamped on the top surface or on both sides of the table which is provided with T-slots for this purpose. For machining very large and heavy components which cannot be gripped on the table, the latter is removed and the components clamped direct on the machine bed.

Parts which for any reason cannot be clamped in the table T-slots are gripped in swivel vices supplied in two sizes: Model Va with a jaw width of 250 mm and Model Vb with a jaw width of 300 mm. These vices are clamped in the central table T-slot which is made with the utmost accuracy.

The operation of the machine is effected simply and quickly by control levers centralized on one side of the machine.

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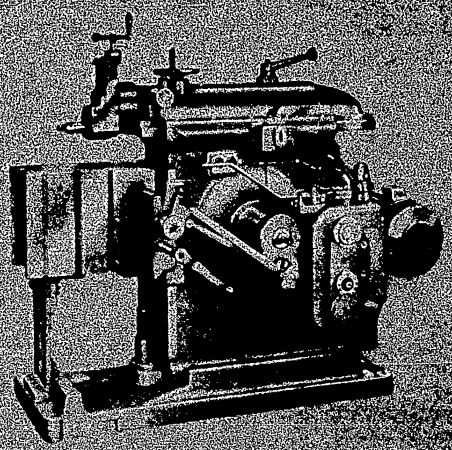
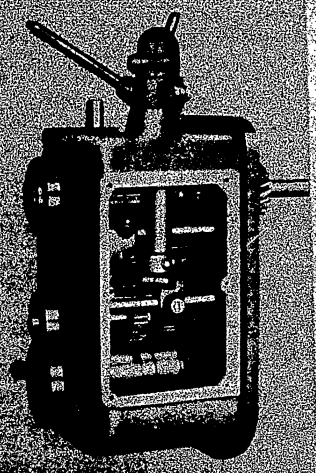




HM45

TYPE HM 45 SHAPING MACHINE

An economical heavy duty machine for the shaping of horizontal, vertical as well as angular surfaces and internal splines of medium size production.

HOUSING

The housing is box shaped, ribbed of high grade cast iron. It is designed to withstand the stresses made on the machine during operation to ensure long life and accuracy.

GEAR BOX

The gear box, which contains the drive and is built in unit with the housing, is mounted on the back of the housing. The drive to the ram is derived from a single pulley which is driven by a V belt from the motor. Four speeds are obtained by means of a sliding gear. Two speeds are obtained by means of a clutch operated by the lever on the front of the gear box.

LINK MOTION

The link motion of the machine is manufactured with the greatest care to the very finest tolerances with the greatest lubrication ensuring long life.

RAM

The ram has flat guideways and its play caused by wear is taken up by means of an adjustable wedge in the housing. The setting of the ram is effected by means of a hand wheel, the handle having first been slackened.

The swivelling head of the ram carries the guideways for the tool slide. The swivel, when angular surfaces are to be machined, may be read on a scale. The feed of the tool slide is hand and power operated. The table has a movement along the vertical guideways of the housing. The cubing and lowering is done by hand. The table may be moved crosswise by hand or by power.

LUBRICATION

There is a combined pressure, splash and drip feed lubrication system. All highly stressed points are lubricated by a hand operated plated pump.

ELECTRICAL EQUIPMENT

The machine is started by means of a push button operated contactor which is fitted with thermal protection against damage by overload. The design of the electrical equipment is flameproof and it corresponds to the appropriate standard specifications.

STANDARD EQUIPMENT

Electric motor, all electrical equipment, tool holder, tool clamping screws, V belts, motor V belt pulley, operating instructions.

OPTIONAL EQUIPMENT

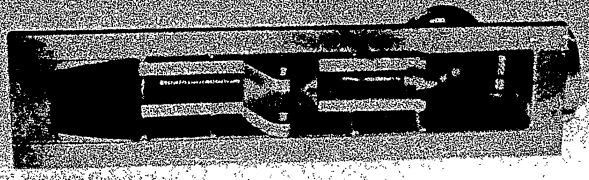
The optional equipment is supplied only to special order requirements.

Universal vertical slide.

Graduated feeding screw.

Automatic power feed of table in both directions.

Equipment for shaping internal splines.



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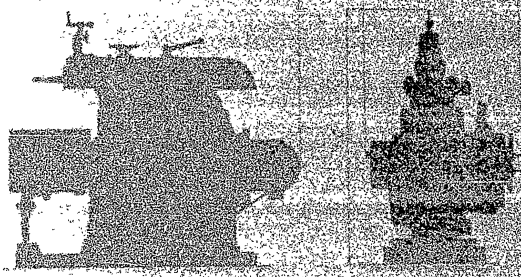
SPECIFICATION

Shaping length	mm	450	17¾"
Clamping surface of table (width × length × height)	mm	310 × 450 × 350	12" × 18" × 13¾"
Number of tablets		3	
Width × pitch of T slots	mm	18 × 100	[illegible] × 3 [illegible]
Vertical movement of table	mm	330	13"
Horizontal movement of table	mm	350	13¾"
Vertical movement of tool slide	mm	150	5¾"
Adjustment of ram	mm	350	13¾"
Maximum minimum distance, clamping surface of table to tool slide	mm	275/45	14¾"/1¾"
Number of speeds		16 to 81	
Number of double strokes per min.		16 to 81	
Horizontal power feed of table per stroke ranging from	mm	0.2 to 1.2	0.008" to 0.048"
Power feed of tool slide per stroke	mm	0.17 to 0.6	0.0068" to 0.02"
Motor for drive of table; speed	r.p.m.	1420	
output	kW	4	
Floor space required by machine (width × length)	mm	920 × 1550	36¼" × 60"
Weight of machine with standard equipment	kg	1200	2650 lbs
Shipping weight of machine, railway packing	kg	1240	2730 lbs
Shipping weight of machine, seaworthy packing	kg	1340	3400 lbs
Volume of packing case	cu. metres	3.31	118 cu. ft.
Dimensions of packing case (width × length × height)	mm	1050 × 1500 × 1550	42" × 71" × 63"

	A	B	C
mm	1690	920	1450
feet - inches	5'5⅛"	3'⅝"	4'9"



PLEASE STATE IN YOUR ORDER THE VOLTAGE AVAILABLE FOR THE ELECTRIC MOTORS.

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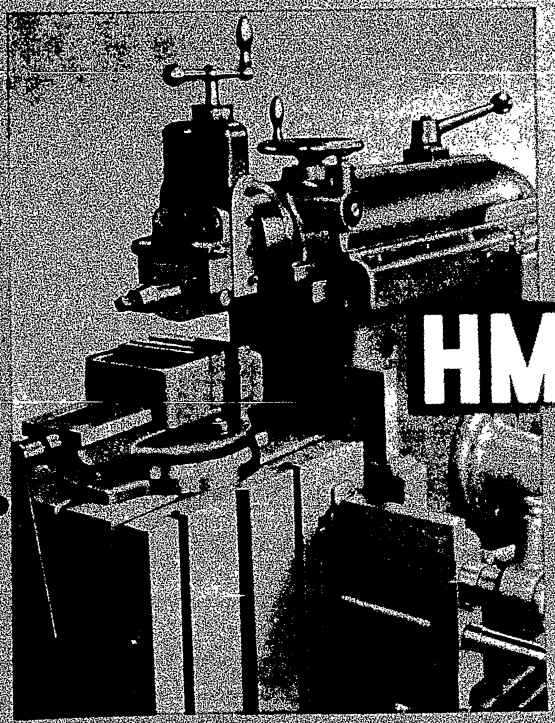

HM45

TYPE HM 45 SHAPING MACHINE

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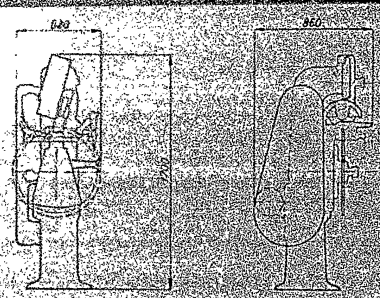

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SPECIFICATIONS

		Metric	English
Maximum cutting length	mm	600	23 [illegible]
Clamping surface of table (width × length × height)	mm	36[illegible] × 60[illegible] × 960	14[illegible] × 23[illegible] × [illegible]
Vertical travel of table	mm	280	1[illegible]
Cross travel of table	mm	[illegible]	[illegible]
Vertical travel of tool slide	mm	125	4[illegible]
Maximum minimum distance, table to tool slide	mm	360 115	[illegible]
Number of cutting speeds		8	8
Number of double strokes per minute		72 132	[illegible]
Automatic cross feed of table per 1 stroke	mm	0.14 1.4	[illegible]
Automatic feed of tool slide per 1 stroke	mm	0.17 1.2	[illegible]
Main drive motors Speed	r. p. m.	1420	142[illegible]
Output	HP	5.5	5.5
Floor space required	mm	1140 × 1925	4[illegible]
Weight of machine with Standard equipment	kg	1870	41[illegible] lbs
Railway packing	kg	1915	42[illegible] lbs
Seaworthy packing	kg	2215	48[illegible] lbs
Contents boxed	m³	4.6	162 [illegible]

STANDARD EQUIPMENT: Electric motor with electrical equipment, tool holders, set of spanners, [illegible] motor pulley, operating instruction booklet.

OPTIONAL EQUIPMENT: Swivel vice — width of jaws 250 mm, maximum clacking width 300 mm

IN ORDERING SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY

As improvements in design are continually being made, the above specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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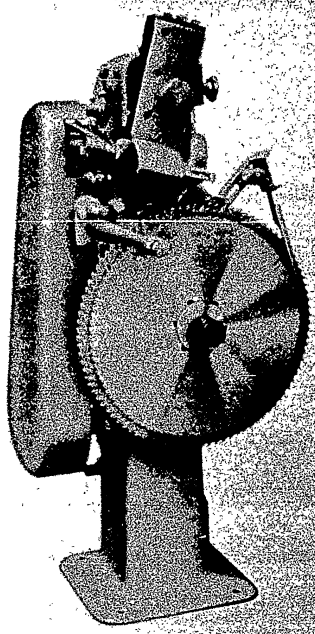
BP 12



SAW SHARPENING MACHINE BP 12

The machine is intended for the correct and efficient sharpening of saw teeth of saw blades or bands.

The wheel-head slides in the V-guides of the column which is cast in one piece with the base plate. The notches of the wheel-head may be changed while cutting. The cam-operated motion of the wheel-head assures the grinding of the correct profile of the saw teeth of any tooth pitch.

The wheel-head is mounted in precision anti-friction bearings and driven by a split belt from the gear box through an idler and a driving pulley. The spindle end, with the spindle is adjustable on the segmental guide of the wheel-head.

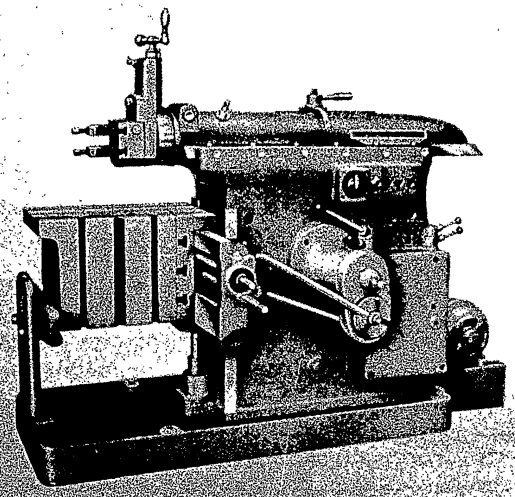
The gearbox with the two-speed intake of the wheel head is driven by a flat belt from the electric motor located at the rear of the machine. It is totally enclosed and protected from the abrasive dust. Rapid passage is provided for setting operation of small distances and for small tooth spaces.

The work slide of the swivel type for clamping the saw blade can be adjusted on a unit provided on the column, to suit the required cutting angle. The saw blade is automatically indexed by means of a dividing attachment so that even damaged saw blades can be resharpened.

The lubrication of all moving parts of the gearbox is by a plunger pump.

The dust exhaust attachment collects the abrasive dust in the lower part of the column.

TOS



SHAPING MACHINE MODEL VOB 600

This machine is suitable for a general line of shaping on plane surfaces. The swivelling tool head carrying the tool slide can be adjusted also for angular cutting.

High output, smooth running and reliability in service are characteristic features obtained as a result of the rich experience gathered under the most different operating conditions.

The accuracy of work is assured by the heavily dimensioned and stiffly mounted base, wide guide-ways both for the vertical and cross adjustment of table and by the precision arrangement of the slide mechanism.

The machine has 8 cutting speeds which are easily changed by two hand levers arranged on the gearbox. The return stroke is quick-acting mechanism with wide bearing surfaces for the shaping tool, which results in the reduction of the wear to a minimum degree.

The table is carefully adjusted to a plane casting. Universal adjustment is provided for the table. The feed is variable by hand and automatically with infinite variation. The machine is driven by a 4 pole squirrel cage electric motor by V-belts with protective steel-strip by tension adjustment.

The operating mechanism is easy to survey and the controls arranged and ready to hand, so that every operation can be carried out easily from the front of the machine.

VOB

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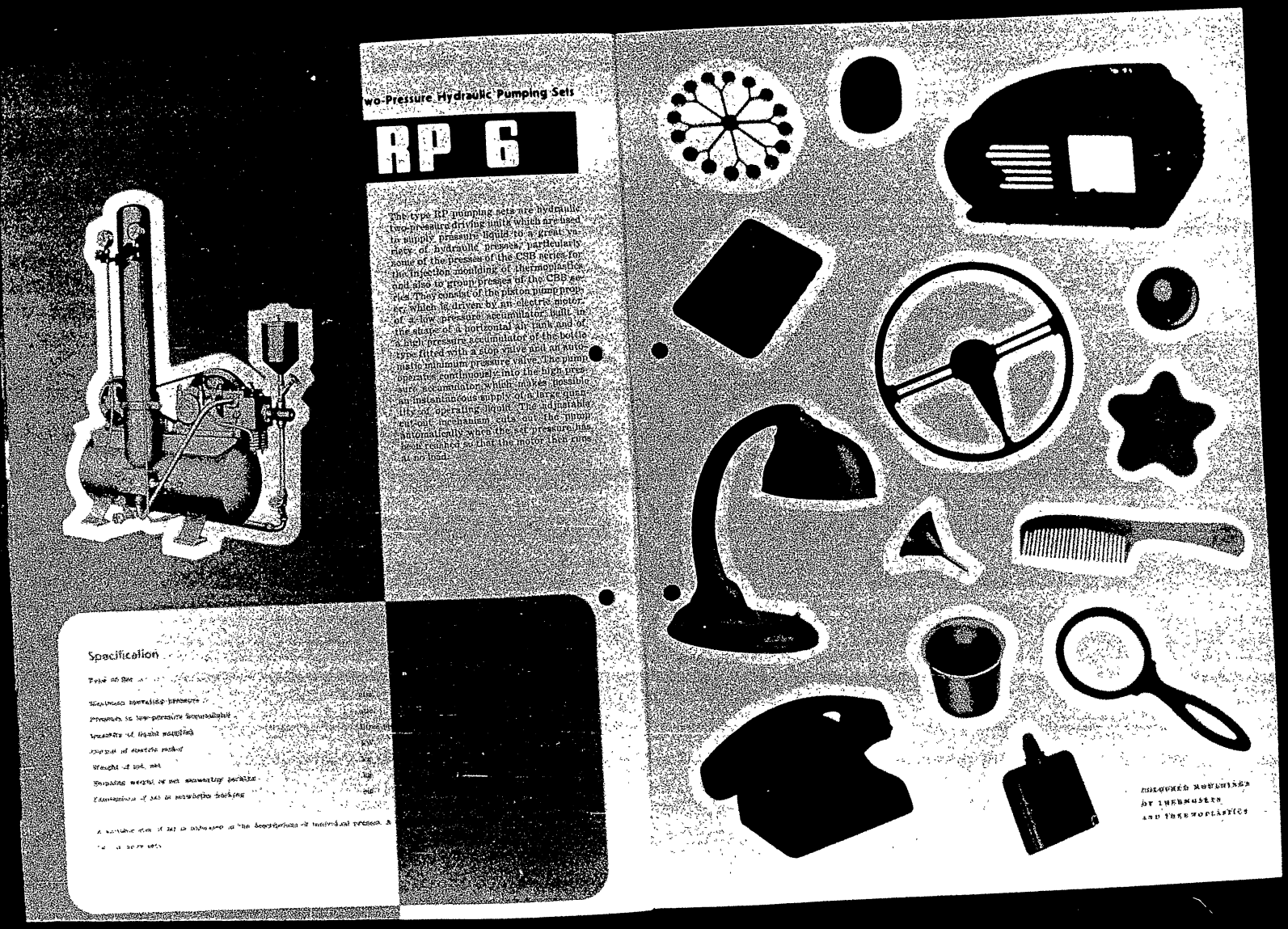

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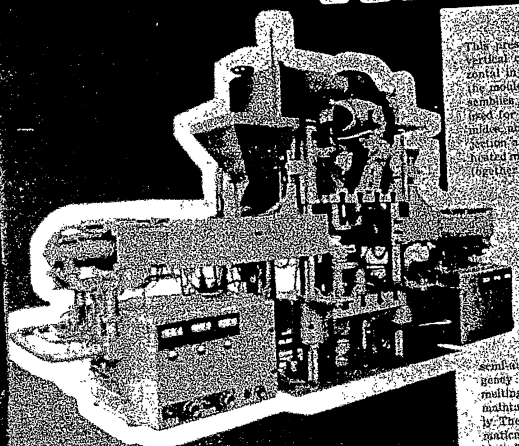
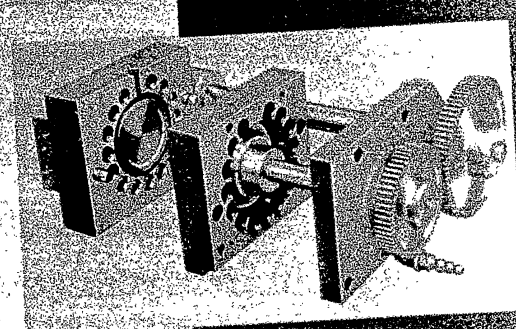
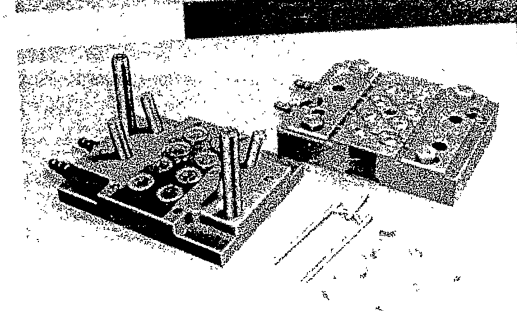
SB 500.50 Semi-Automatic Hydraulic Press for Products of Thermoplastics

CSB 500·50



This press, at present the largest, has vertical closing of the mould and horizontal injection into the parting line of the mould by means of two injection assemblies fitted opposite each other. It is used for processing polystyrenes, polyamides, acetates of cellulose, etc. Each injection assembly has its own electrically heated melting chamber and is adjustable, together with this chamber, vertically and horizontally, independently of the other assembly. The closing part is of the single-pressure type, of a four-column design. The mould is closed by pressure liquid supplied by the machine's own pump, the injection of the material is done by pressure from an accumulator which is charged by this pump. The entire operation of the press is controlled by push-buttons. It is semi-automatic with provision for emergency control. The temperature of the melting chambers is adjustable and it is maintained at the set figure automatically. The feeding equipment measures automatically the dose of material for every shot. The pump, the accumulator and all instruments are mounted directly in the press.





Specification

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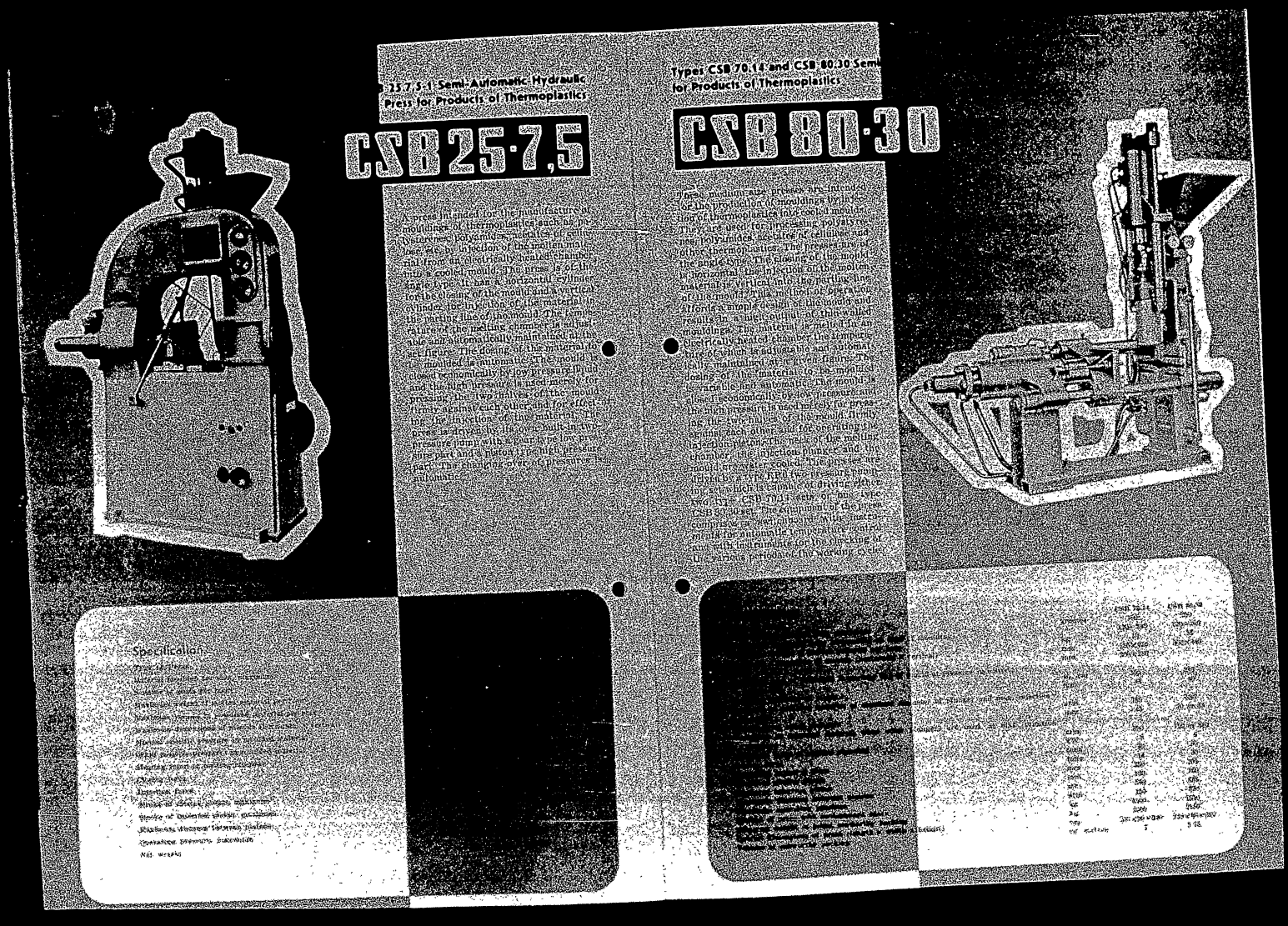

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CSO 8,3 Hydraulic Press for Products of Thermoplastics

CSO 8,3

A press intended for the manufacture of small articles of thermoplastics by injection into moulds. It is suitable in particular for mouldings produced by individual injection for which small tolerances (as low as 0.03 mm) are allowed, such as parts of wattlour meters, etc.

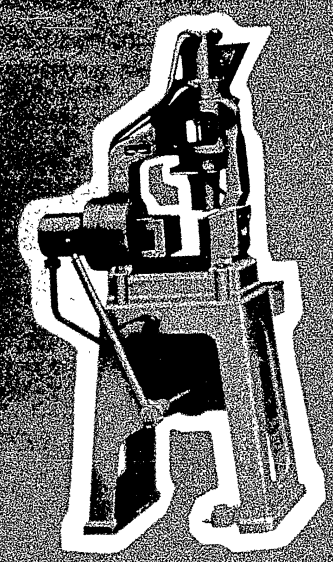
The press is of horizontal design, with central injection of the material perpendicular to the parting line of the mould. The material is heated in an electrically heated chamber where the temperature is adjustable and automatically controlled. The mouth of the melting chamber and the mould are water cooled. The press is driven by a liquid supplied by a type RP1 two-pressure pumping set, which is also sufficient for two presses, or by a type RP6 set which can drive a group of up to twelve type CSO 8,3 presses.

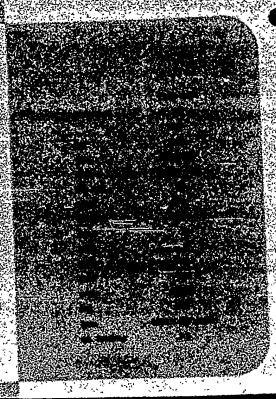
Type CSB 12-4,5 Hydraulic Press for Products of Thermoplastics

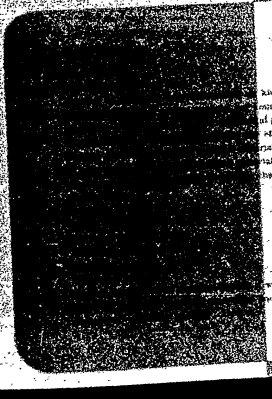
CSB 12-4,5

A semi-automatic machine intended for the manufacture of medium and small size mouldings of thermoplastics by injection into moulds. It is suitable for the processing of polystyrenes, polyamides, acetates of cellulose and other thermoplastics.

The design is of the angle type. The closing of the mould is horizontal, the injection vertical in the parting line between the two halves of the mould. The material is melted in an electrically heated chamber the temperature of which is automatically maintained at the set figure. The dosing of the material from the hopper into the melting chamber is done automatically at every stroke and is adjustable. The mould is closed economically by low pressure liquid. The high pressure liquid merely presses the two halves of the mould firmly against each other and produces a powerful movement of the injection piston. The feeding part of the melting chamber and the mould are water cooled. For the drive of one press a type RP1 two-pressure set is used. A larger set of the type RP6 is suitable for the drive of a group of up to five type CSB 12-4,5 machines.







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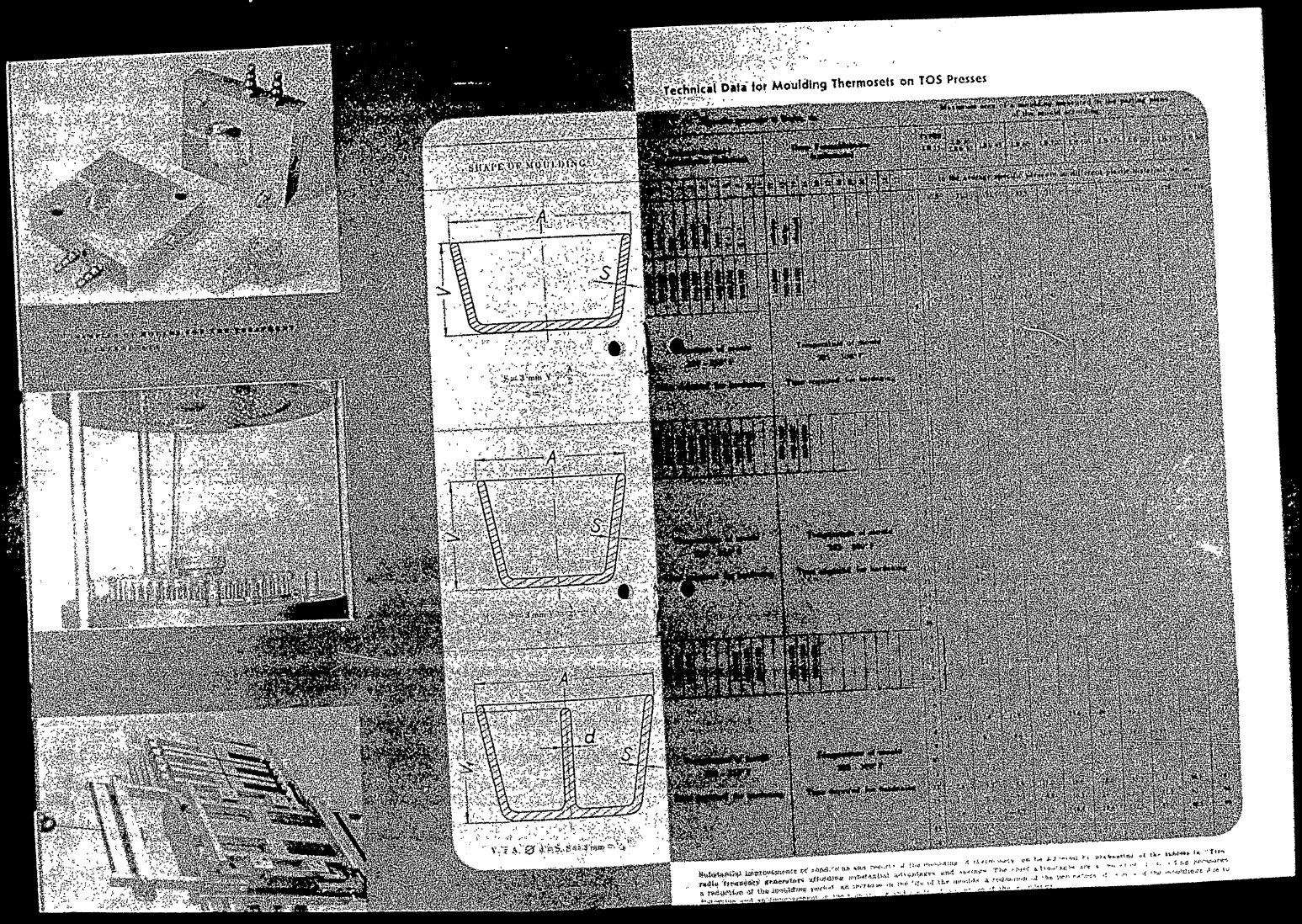

Technical Data for Moulding Thermosets on TOS Presses

SHAPE OF MOULDING

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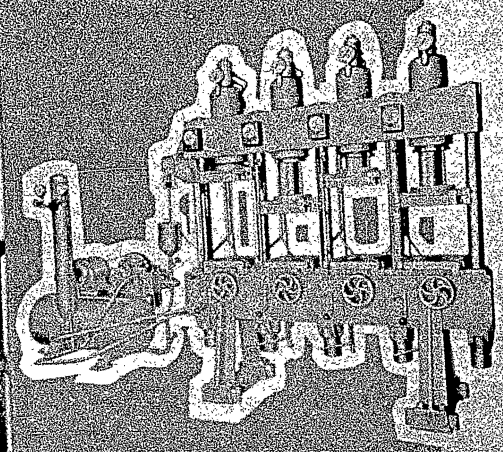
Manufacture of Articles of Thermosets

Type CBB 15 and CBB 30

CBB 30

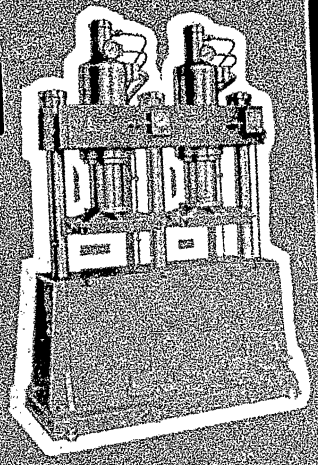


A group press is formed by combining several press units to a common frame. Group presses of two to six units of capacities of 15 to 30 tons are manufactured. This arrangement has a number of advantages. In the first place, it affords the possibility of manufacturing on one machine several kinds of mouldings simultaneously and permits the use of inexpensive simple moulds. The closing speed of the piston is adjustable at will and can be controlled in the course of the stroke similarly as with the moulding pressure. The press opens automatically after a set period so that a single operator can operate a whole group. For the drive of the whole group press a type RP 12 oil pressure pump plant is used the size of which is determined in accordance with the number of press units fitted.

Specification

Type CBB 60 Hydraulic Double Press

CBB 60



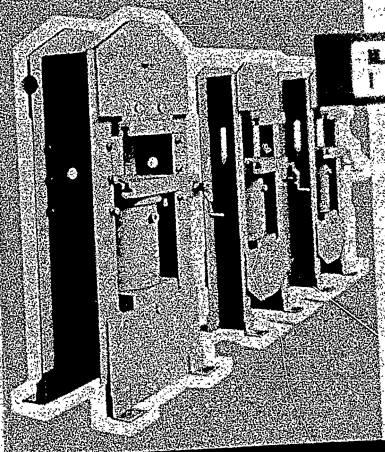
A press for moulding articles of thermosets with a high operating speed. It is of the top-pressure column design with hydraulic ejection and automatic timing of the opening after a set period. A type RP 12 pump is used for the drive.

Specification

Moulding force	tons	60
Opening force	tons	10
Ejector force	tons	3.4
Piston force of ejector	tons	3.7
Stroke of ejector	mm	20
Stroke of piston	mm	250 (300)
Dimensions of moulding plates	mm	320×320
Clear width between columns	mm	220
Operating pressure	kg/cm²	350

60 and 150 Tons Hydraulic Presses

60 · 150



Presses of simple design for the manufacture of buttons. They are of the bottom-pressure type with gravity return of the piston.

Specification

Moulding force	tons	150	60
Maximum distance of platens	mm	300	300
Stroke	mm	200	200
Platen size	mm	500×500	320×320
Dimensions of tie-rods	mm	220	220
Operating pressure	kg/cm²	350	350

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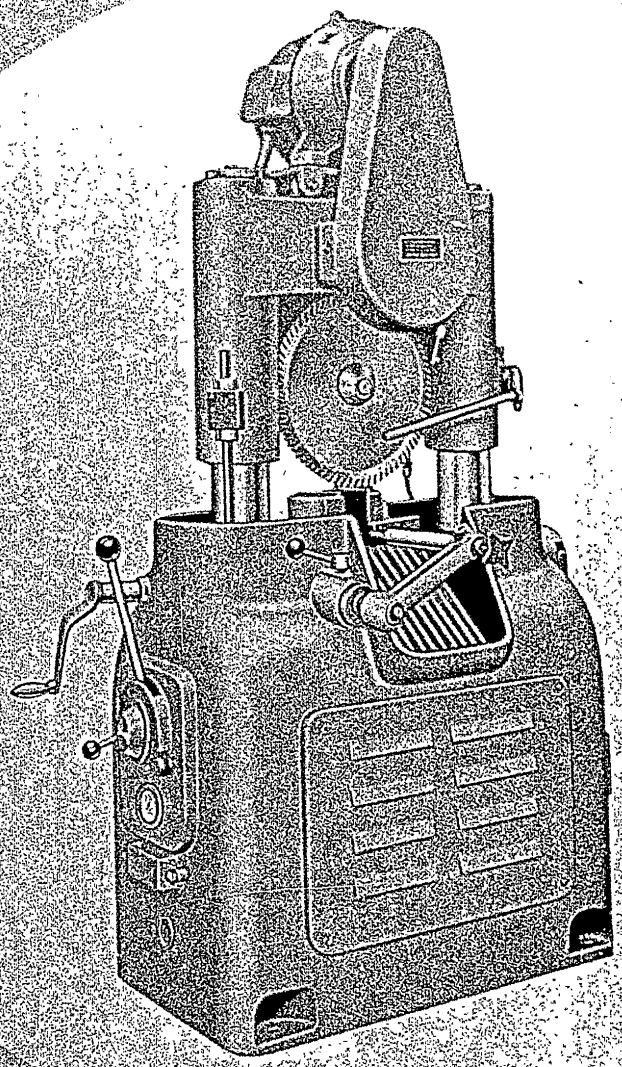

HYDRAULIC CIRCULAR SAW MODEL 350

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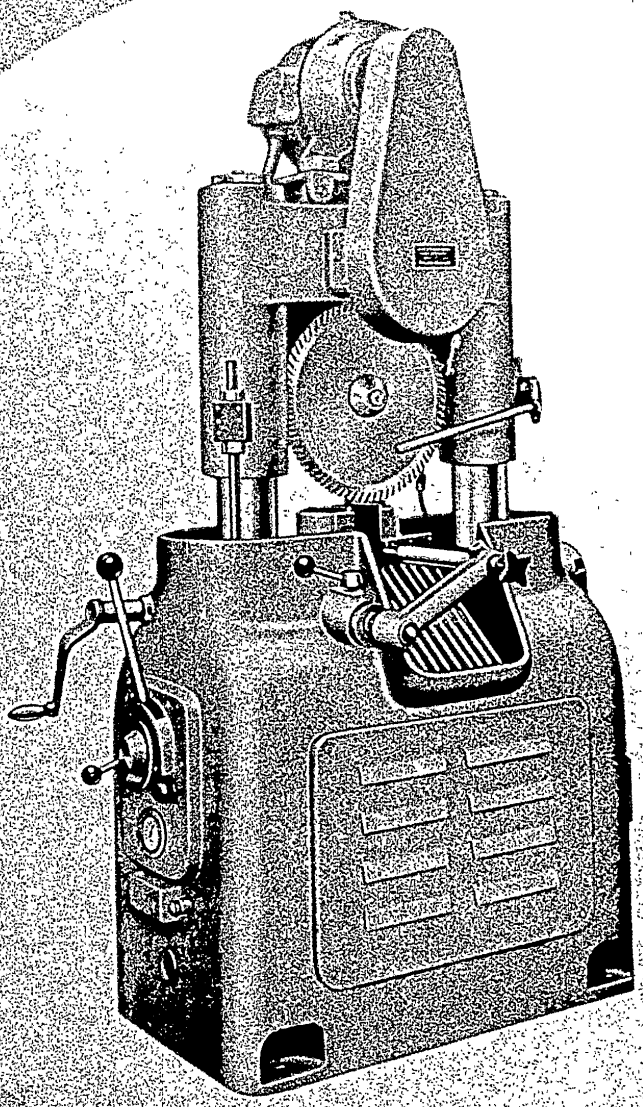

HYDRAULIC CIRCULAR SAW MODEL H 350

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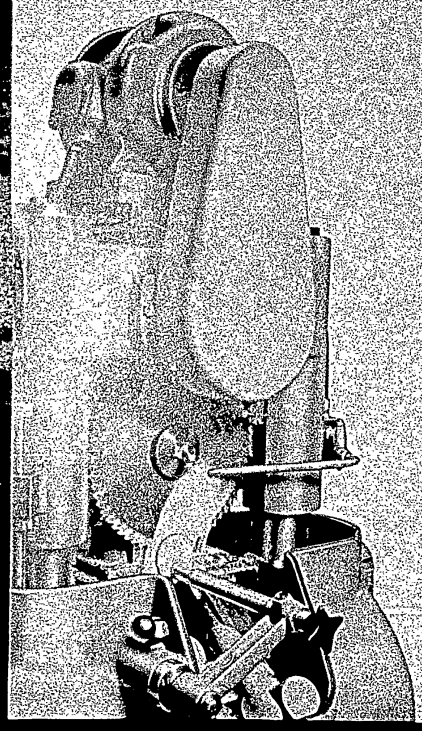
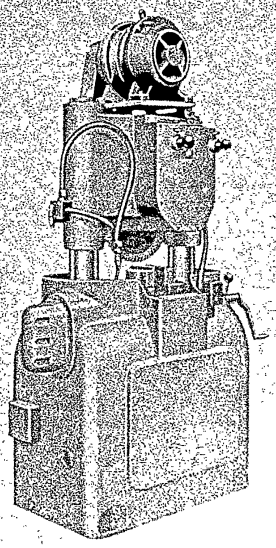
HYDRAULIC CIRCULAR SAW MODEL H 350

Heavy Duty Cold Sawing Machine equally at home in medium size and large shops both with quantity and single part production

Outstanding features and advantages:

- Four speeds of saw blade
- Hydraulic feed of saw blade into the cut infinitely variable
- Hydraulic clamping of material





THE HEADSTOCK slides on the two-column guideways. The saw blade is clamped to the spindle. The transmission gears inside the headstock provide 4 cutting speeds of the saw blade. Power is transmitted by V-belts from an electric motor mounted on a hinged plate. All shafts rotate in anti-friction bearings and the transmission gears are running in an oil bath. Both the headstock feed into the cut and the rapid return proceed hydraulically. The feed speed is infinitely variable to suit the tensile strength and the dimensions of the material to be cut. Adjustable feed stops are provided for limiting the feed height and for automatic feed release.

THE COLUMN with the column ways and the headstock form a rigid frame to eliminate vibrations of the machine even at peak output. It contains the hydraulic system with the power unit and the oil tank as well as the cooling attachment with the coolant tank, and the readily accessible chip space.

THE CLAMPING ATTACHMENT is operated hydraulically the clamping pressure being always higher than the pressure for the headstock feed. Both pressures are checked on a pressure gauge provided on the control panel which is fixed to the column. The vice clamps securely the stock even before the saw blade feed into the cut has started. The stock to be cut is always located accurately opposite the centre of the saw blade so that the saw blade feed proceeds always on the shortest path. Thus the shortest possible cutting time is achieved. Both the headstock feed and the material clamping are operated by a single hand lever. The machine is equipped with a complete cooling attachment. Coolant water is supplied to the work in a sufficient quantity on both sides of the saw blade.

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STANDARD EQUIPMENT

Saw-blade, 2 motors with pulleys and V-belts, electrical equipment including switches and fuses, cooling attachment, pressure gauge, operating instructions.

OPTIONAL EQUIPMENT

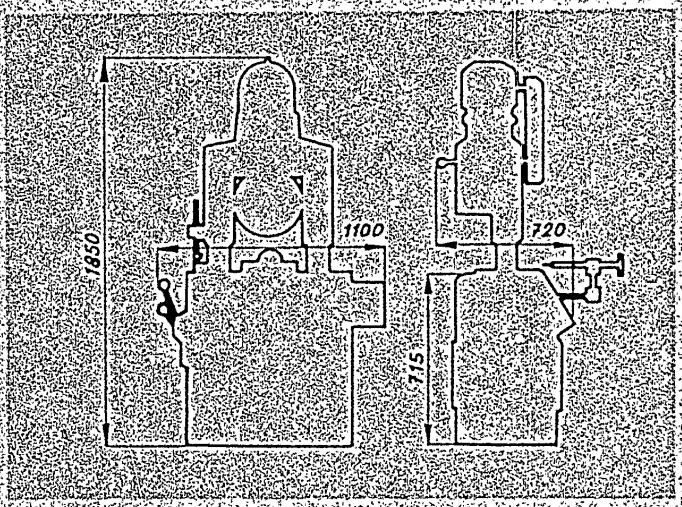
Material feed.

SPECIFICATIONS

Max. dia. of saw-blade		mm	260
Max. dimensions of stock	round stock	dia mm	115
	square stock	mm	110
	flat stock	mm	140 × 105
Number of cutting speeds			4
Cutting speed with the saw-blade dia.		mm	310 360
at 10 r. p. m. of saw-blade		m/min	9.8 11.3
at 13 r. p. m. of saw-blade		m/min	13.6 15.8
at 18 r. p. m. of saw-blade		m/min	17.5 20.3
at 25 r. p. m. of saw-blade		m/min	25.3 29.4
Hydraulic feeds infinitely variable and ranging from:		mm/min	0—500
Rapid return		mm/min	500
Headstock motor: speed		r. p. m.	1420
output		HP	4
Pump motor: speed		r. p. m.	1400
output		HP	1
Floor space required		mm	1100 × 760
Weight of machine with standard equipment		kg	790
Weight of machine with packing		kg	850
Weight of machine with seaworthy packing		kg	920
Dimensions of case		cm	125 × 90 × 100
Contents lined		m³	1.6

In ordering, specify voltage, phase and frequency of power supply!

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.



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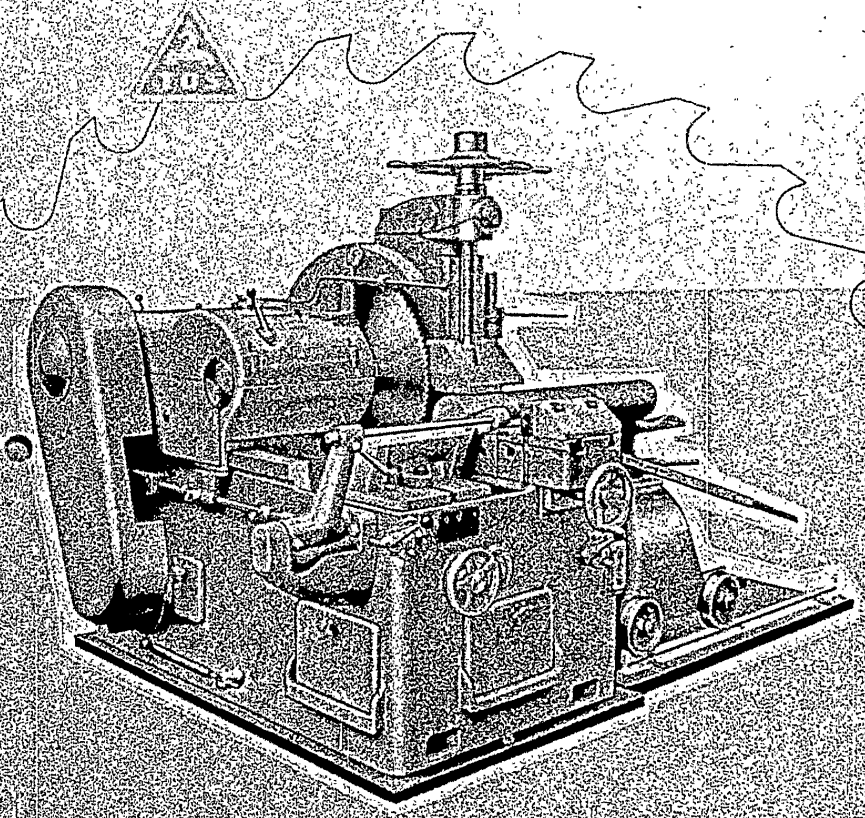

Type P27 CIRCULAR SAW

P27

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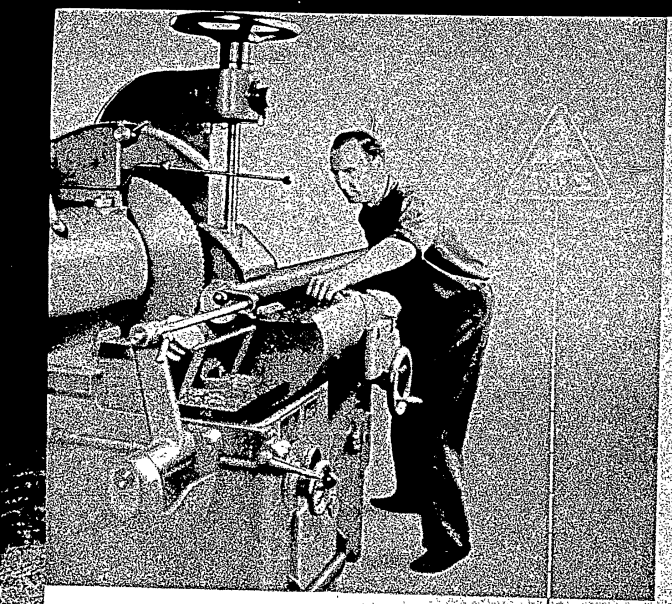


Type P27 Circular Saw

A Heavy Duty Machine for cold cutting of steel, suitable for medium size and large plants engaged in repetition work as well as in single piece manufacture.

- four speeds of saw blade
- Hydraulic feed into cut infinitely variable.
- Automatic counter-pressure arrangement preventing undesirable acceleration of feed before beginning and on completion of cut or during sudden changes of cross section.
- Hydraulic clamping of stock.
- Semi-automatic operation of machine.
- Ease of operation.

P27

DESCRIPTION

Headstock. The headstock slides along the guideways of the bed. A tapered gib affords adjustment of the play. The gear-box, which gives four speeds of the saw blade, is driven by the electric motor by means of a flat belt enclosed by a guard. A jockey pulley equalizes the distance between the shafts caused by the movement of the headstock.

The starting and stopping of the motor is controlled by a push-button by means of a combination of contactors with thermal and electromagnetic overload protection. The starting lever of the spindle and the brake are operated by a single hand lever. The bearings and all the rotating parts of the headstock are lubricated automatically.

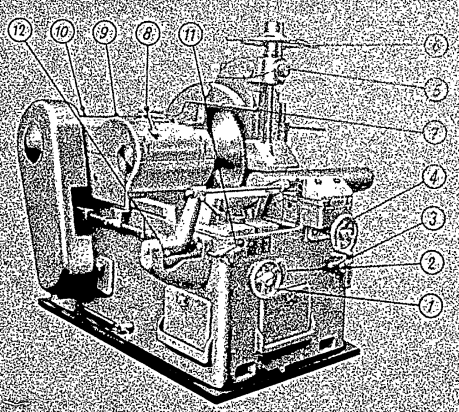
Hydraulic Equipment. The hydraulic equipment consists of a gear pump with a control and distribution assembly and of the necessary working cylinders.

The hydraulic feed into the cut is infinitely variable by means of a hand wheel. It permits the rate of feed corresponding to the tensile strength and dimensions of the stock to be accurately set. The flexibility of the hydraulic feed affords a constant pressure into the cut during variations of the cross section. This preserves the saw blade and protects the machine from overload. An automatic counter-pressure arrangement prevents undesirable acceleration of the feed before the beginning and on completion of the cut or during sudden changes of the cross section. A stop mechanism is provided to limit the travel of the saw to the required length of cut on completion of which the stop disengages the feed and engages a rapid return movement of the headstock.

Clamping of Stock. The stock is clamped hydraulically by a vertical and a horizontal jaw so that a perpendicular cut is assured. The horizontal jaw is arranged for two heights of clamping to permit material of various cross section to be clamped in the most suitable way of the height of the shortest cut.

Cooling equipment. The coolant is supplied to the point of cut from a tank formed in a part of the bed by a gear pump.

CONTROLS:



1. Hand wheel for control of feed.
2. Feed oil pressure gauge.
3. Lever for control of clamping.
4. Hand wheel for horizontal clamping.
5. Clamping pressure gauge.
6. Hand wheel for vertical clamping.
7. Pull-rod for coolant control.
8. Front clutch lever.
9. Gear change lever.
10. Rear clutch lever.
11. Lever for control of feed & rapid return movement.
12. Adjustable stop.

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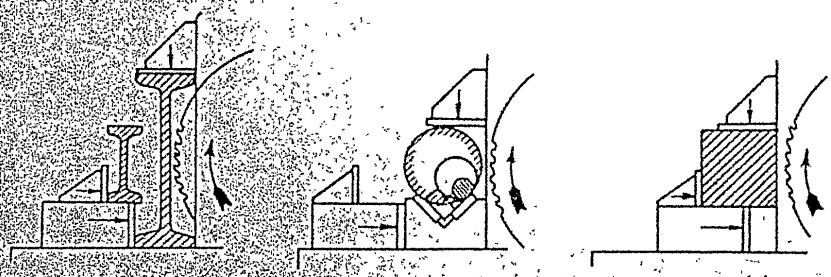


Suitable Methods of Clamping

Specification

Diameter of saw blade	mm	660	710	760
	inches	26	28	30
Maximum size of stock for perpendicular cuts				
round stock	mm/inches	220/8 5/8	245/9 5/8	270/10 5/8
square stock	mm/inches	200/7 7/8	210/8 1/4	245/9 5/8
I-section, standard	size	47,5		55
I-section, broad	size	20		27
Maximum size of stock at slant cuts				
I-section, standard, upright	size	40		50
horizontal	size	13		17
I-section, broad, upright or horizontal	size		16	
Number of speeds of saw blade			4	
Speeds of saw blade	r.p.m.	5.5	7.5	10	13
Cutting speeds per min.				
saw blade 660 mm (26")	dia., metres	11.4	15.5	20.4	26.4
	feet	34 1/2	51	67	86 1/2
saw blade 710 mm (28")	dia., metres	12.2	16.6	21.8	28.3
	feet	40	54 1/2	72	93
saw blade 760 mm (30")	dia., metres	13.6	18.5	24.3	31.5
	feet	44 1/2	60 1/2	80	103
Range of infinitely variable hydraulic feeds		mm per min.	0 to 400	/ 0 to 16" per min.	
Rapid return movement		mm per min.	2000	/ 6 1/2 ft. per min.	
Floor space of machine		mm/inches	1400×2100	/ 56×83	
Weight of machine with standard equipment (design for perpendicular cuts)					
net		kg/lbs	3620	/ 7980	
shipping, railway packing		kg/lbs	3670	/ 8090	
shipping, seaworthy packing		kg/lbs	4220	/ 9300	
Volume of packing case		cu. metres/cu. ft.	6	/ 212	

STANDARD EQUIPMENT:

Cooling equipment, clamping equipment, electric motor with electrical equipment, set of spanners, tables, operating instructions.

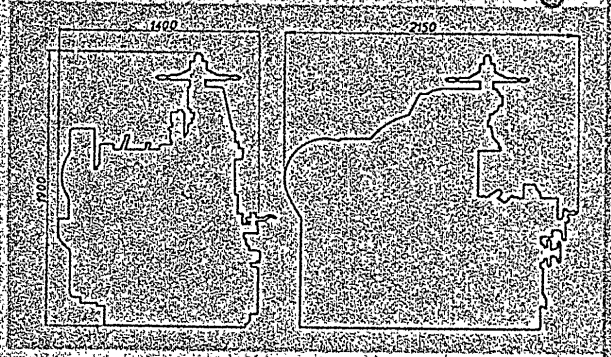
OPTIMAL EQUIPMENT:

Supporting truck and saw blades of various diameters according to separate quotation.

The machine can be supplied to special order and against extra charge, arranged for slant cuts up to an angle of 45°.

Please state in your order the voltage available for the electric motors.

The machines are continuously being improved upon. The data given in this prospectus are therefore not binding in detail.



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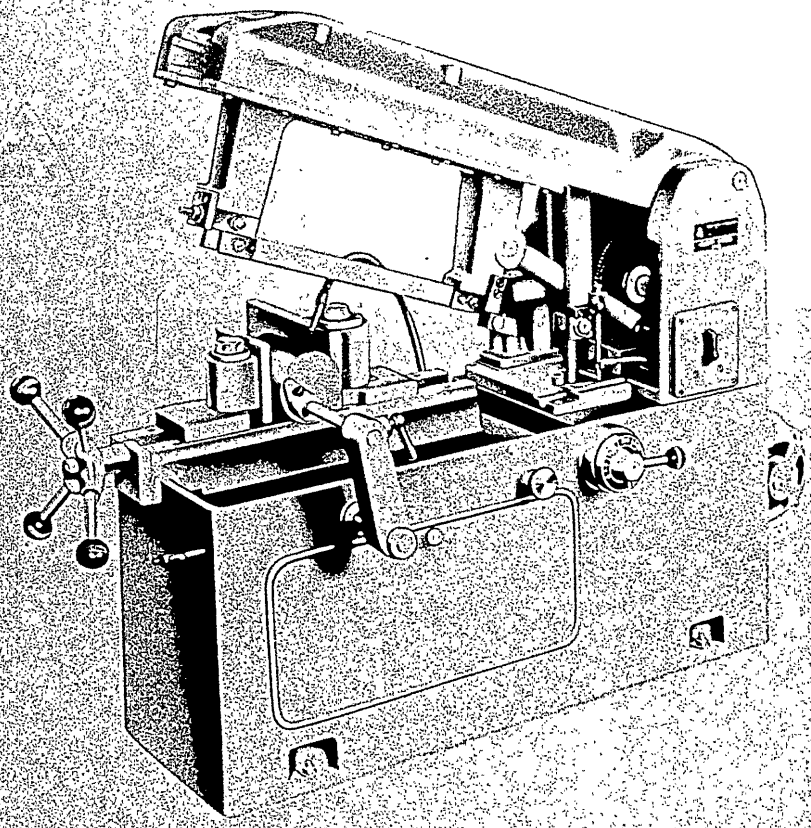

HACKSAW MACHINES

PR30

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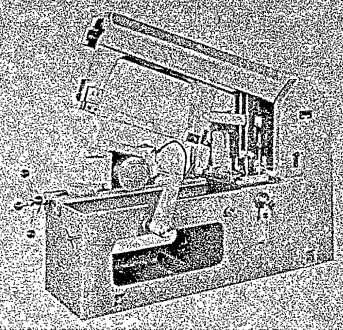
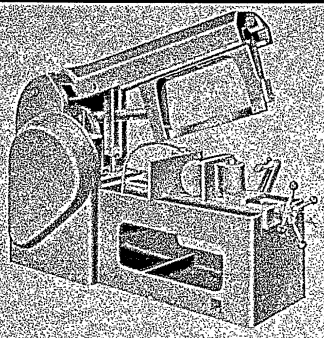


HACKSAW MACHINE Type PR 30



HACKSAW MACHINE Type PR 30
With motor incorporated in the bed.

HACKSAW MACHINES Types PR 20 and PR 30

High Duty Machines for cutting metals of all sections and tensile strengths.

THE ARM carries the movably mounted saw-bow which is hydraulically actuated by a single lever. During the cut the arm pressure increases gradually and in reversing the arm is slightly elevated. After the cut is completed the arm returns automatically to its upper position which is adjustable according to the dimension of the material being cut.

THE SAW-BOW is mounted in the flat arm-ways. The drive is by a mechanism the two speeds of which are obtained by shifting a V-belt.

THE BED is provided with flat ways. This swivel vice, enables the cutting at different angles and its jaws are easily interchanged for cutting the material in bundles. The hydraulic system and the coolant tank are located inside the bed.

COOLING ATTACHMENT. The coolant is supplied by a coolant pump driven from the electric motor by V-belts.

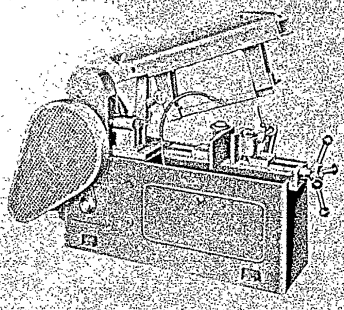
THE ELECTRICAL EQUIPMENT consists of the electric motor and a switch which is actuated from the operating position.

STANDARD EQUIPMENT. Electric motor 220/380 volts with equipment, pulley, 2 V-belts, saw blade, spanners, coolant pump with piping, oilcan, operating instruction booklet.

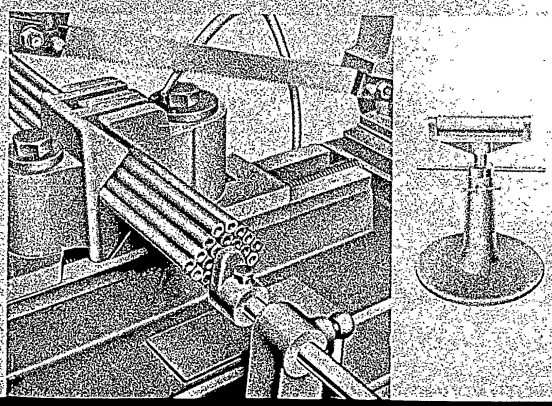
OPTIONAL EQUIPMENT. Vice-jaws for clamping the material in bundles, bar-rest.

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

IN ORDERING, SPECIFY VOLTAGE, PHASE AND FREQUENCY OF POWER SUPPLY!



HACKSAW MACHINE Type PR 20
With motor mounted on a bracket at the rear of the bed. The belt transmission is protected by belt guard.



Vice-jaws for clamping of material in bundles.—Bar rest.

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SPECIFICATION

Type					
Cutting speed (variable)					
Stroke of bow					
Distance between saw-blade holes					
Number of double strokes of saw-blade per min.					
Motor					
Speed	r.p.m.	1460	1460	1400	1400
Output	kW	0.8	1.5	0.8	1.5
Floor space required	mm	550 × 1550	850 × 1640	21¾" × 61"	23" × 72"
Weight of machine					
with standard equipment	kg	472	1120	1040	2500
	lbs				
with packing	kg	517	1200	1140	2660
	lbs				
with seaworthy packing	kg	565	1270	1250	2800
	lbs				
Weight of vice-jaws for clamping in bundles	kg	16	50	35	110
	lbs				
Weight of bar rest	kg	28,5	28,5	63	63
	lbs				
Contents boxed	m^3	1,33	2,43	87	87
	cu ft.				
Dimensions of case	cm	190 × 70 × 100	225 × 90 × 120	75" × 27½" × 39½"	89" × 35½" × 48"

DIMENSIONAL DRAWING OF PR 20 AND PR 30

	PR 20	PR 30
A	1550 61,5"	1840 72,3"
B	890 34,7"	1140 44,8"
C	550 21,7"	800 31,7"
D	1150 45,2"	1470 57,7"
E	1250 49"	1800 70,8"
F	500 19,7"	680 26,8"
G	793 31,5"	1255 49,3"
H	320 12,6"	465 18,3"

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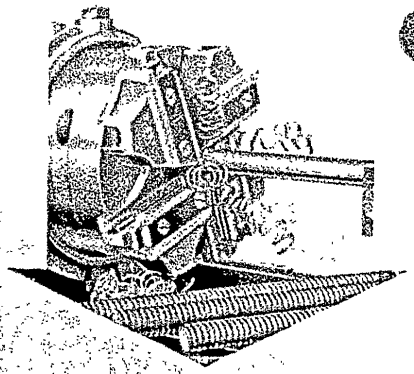

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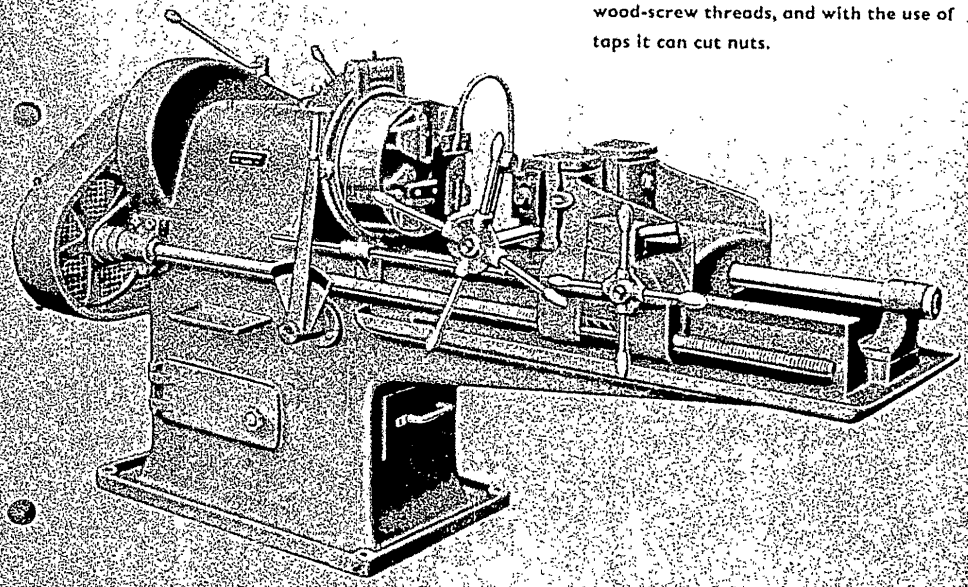
THREADING AND TAPPING MACHINE Model Pv-5

This precision heavy duty machine is designed for a wide variety of threading and tapping operations both in single part and quantity production. In addition to standard threads, it can also produce left hand, trapezoidal, square and wood-screw threads, and with the use of taps it can cut nuts.



TOS

PV5

The main spindle is driven by V-belts from the electric motor through a six speed gearbox. The spindle speeds are changed by means of two hand levers. Starting and stopping of the spindle is done by a lever which actuates the friction clutch.

The die head is controlled by a hand lever or automatically. The instant opening and closing of the dies is done by stops. The tangential die-arms are fixed in folding-up holders.

The carriage with the vice for clamping the work is fed into the cut by power and by hand. The power feed is obtained from the main spindle and the lead-screw through change gears. The hand feed is effected by a spider. A stop rod serves for adjusting the thread length.

The bed has flat guideways for the carriage.

The cooling system consists of a coolant tank arranged in the lower part of the machine base, of a gear pump mounted on the base which is driven by a flat belt from the main spindle, and of piping with an adjustable nozzle.

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Standard equipment:

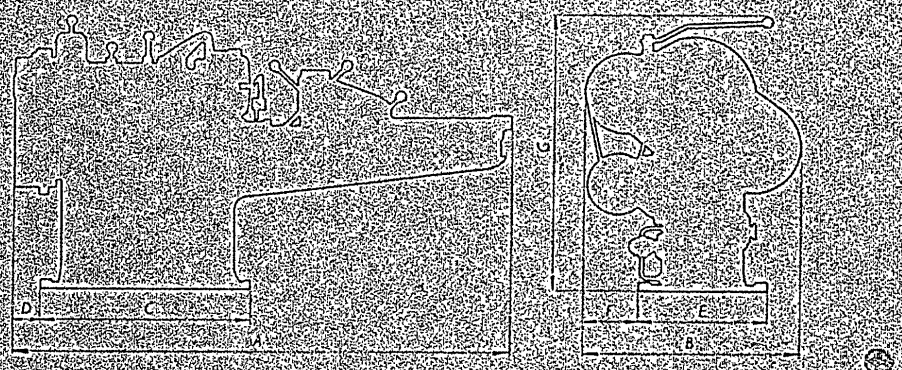
Model Př 5, die-head set of die holders profile B, set of die holders profile C, set of dies for taps, set of dies for metric or Whitworth threads (alternatively), control spanner, setting gauge, 17 change gears for metric and Whitworth threads, 2 V-belts, bracket for electric motor, electric motor for spindle drive, three-pole switch, gear pump, flat belt for gear pump.

Additional equipment:

Complete sets of die holders for left hand, square, trapezoidal and gas threads, set of dies for each class of thread, taps.

Specifications:

		Metric	English
Threading capacity: metric threads	dia. mm	20—64	—
Whitworth threads	dia.	—	3/8"—2 1/2"
gas threads	dia.	—	1/8"—2"
Bore of spindle	mm	68	2.67"
Height, centreline of spindle over bed	mm	175	6.9"
Cutting length without reclamping	mm	550	21.6"
Spindle speeds: 6 ranging from	r.p.m.	23—105	23—105
Electric motor: speed	r.p.m.	1420	1420
output	HP	3	3
Floor space required	mm	925 x 2150	36 1/4" x 85"
Weight of machine: with standard equipment	kg	1250	2760 lbs
with railway packing	kg	1450	3200 lbs
with seaworthy packing	kg	1550	3420 lbs
Contents boxed	m³	3	106 cu. ft.



A	B	C	D	E	F	G
2250	1000	925	100	575	720	1200
88 1/2"	39"	36 1/2"	4"	22 3/4"	28 1/2"	47 1/4"

As improvements in design are continually being made, this specification is not to be regarded as binding in detail, and dimensions are subject to alteration without notice.

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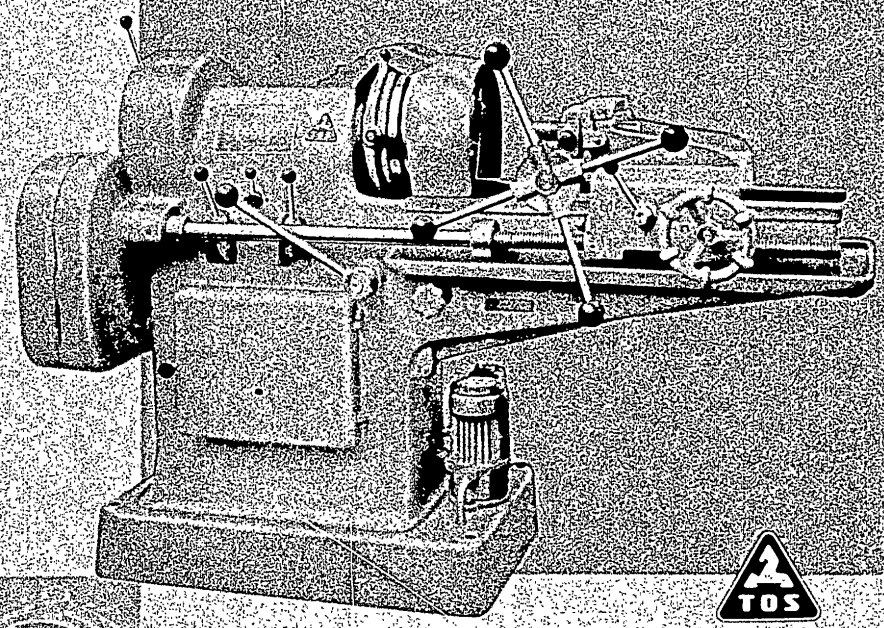
ZV 1040

STROJEXPORT

MODEL ZV-1040 THREADING MACHINE

This is a precision heavy duty machine designed for threading jobs on a high production basis. Besides standard threads also left hand, trapeze, square, wood screw threads, and with the use of taps, nuts can be cut on this machine.



TOS

The work spindle is driven by V-belts from an electric motor through a four-speed gearbox. The speeds are changed by two hand levers. Reversal of spindle rotation is controlled by an electric switch. The starter is mechanically connected with a powerful shoe brake for instant starting and stopping of the machine. The spindle is of the hollow type which enables cutting of long threads.

The die head is operated by a hand lever. Instant opening of the chasers is effected by hand or by power. The tangential chasers are fixed in folding-up holders.

The carriage with a vice for clamping the work is driven by the lead screw through change gears located in an enclosed box. An adjustable stop automatically disengages the clasp nut. The vice is controlled by a cross lever. Inside the bed a stop bar is provided for controlling the thread length.

The bed is a compact unit. A coolant tank is provided in its base. It also contains a box for spare chasers, chaser holders and change gears. Chips are collected in a tilting pan.

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The cooling attachment is of the spray type and is situated in the folding-up die head cover. The coolant is supplied by an electric pump.

Standard equipment:

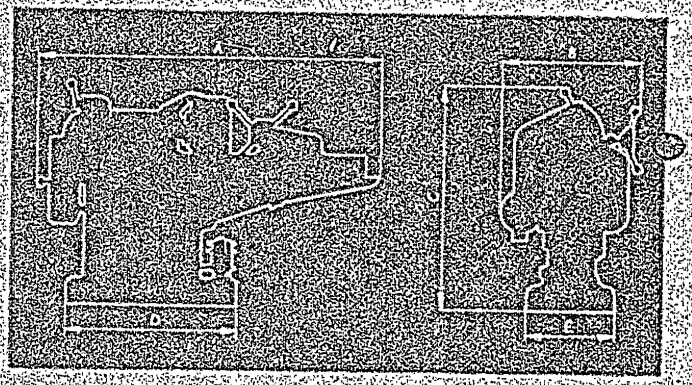
Die head Ph 3, set of chaser holders, set of chasers, set of chasers for taps, control spanner, setting gauge, 18 change gears, 2 V-belts, electric motor for spindle drive, electric motor for pump drive, reversing switch, operating instructions.

Additional equipment:

Additional sets of chasers, respective chaser holders.

SPECIFICATIONS:

		Metric	English
Threading capacity – metric	Ø mm	10—40	
Whitworth	Ø		3/8"—1 1/2"
gas	Ø		1/8"—1 1/4"
trapeze	Ø mm	10—36	0.395"—1.42"
round	Ø mm	12—30	0.475"—1.18"
Bore of spindle	mm	55	2 1/8"
Distance: centreline of spindle to bed	mm	125	5"
Cutting length without reclamping	mm	400	15 3/4"
Spindle speeds: 4 in number ranging from	r. p. m.	42—156	42—156
Speed of motor	r. p. m.	1450	1450
Output of motor	HP	3	3
Floor space required	mm	850 × 1800	33 1/2" × 71"
Weight of machine with standard equipment	kg	880	1950 lbs
with railway packing	kg	960	2120 lbs
with seaworthy packing	kg	1080	2400 lbs
Contents boxed	m³	2,9	102 cu. ft.



A	B	C	D	E
1800	850	1200	900	500
71"	33 1/2"	47 1/4"	35 1/4"	19 3/4"

As our machines are continually being improved upon the above data are not binding in detail.

WHEN ORDERING, SPECIFY VOLTAGE, PHASE, AND FREQUENCY OF POWER SUPPLY!

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